APRIL 1952 IN TWO PARTS - PART TWO

18th ANNUAL PLANT BUILDINGS ISSUE

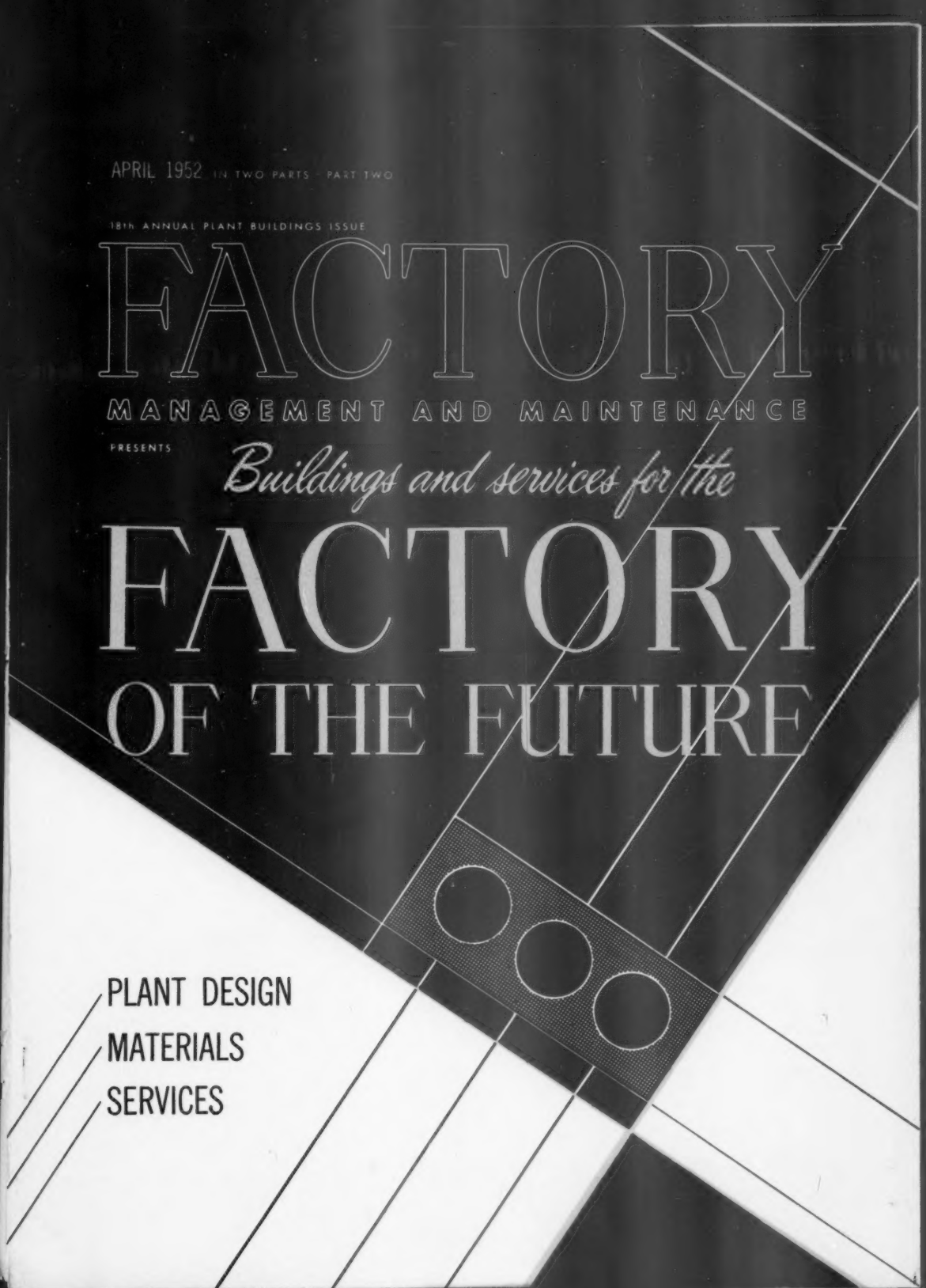
FACTORY

MANAGEMENT AND MAINTENANCE

PRESENTS

Buildings and services for the

FACTORY OF THE FUTURE



PLANT DESIGN

MATERIALS

SERVICES

Building? Modernizing?

INSTALL GREASEPROOF TUFF-TEX FLOORS!

TUFF-TEX* Floor Tile is *specifically designed* for industrial applications!

It's greaseproof . . . fire resistant . . . impact resistant! Takes *all* heavy truck traffic, floor vibrations, the dropping of heavy boxes and tools!

It has a lustrous, close-textured surface that provides safe, sure footing. And offers rich, deep colors that many plants select to help keep workers' morale high.

Use Tuff-Tex in traffic aisles . . . with built-in safety markers that can't wear off.

Use it in machine areas. Cutting oils, lubricants and metal chips can't hurt Tuff-Tex!

Use it in food serving areas for plant kitchens and cafeteria floors.

Use it in employment and other offices where appearances count . . . yet where floors are subjected to extremely hard usage.

Flexachrome, too, has many industrial advantages!

Greaseproof Flexachrome* Plastic-asbestos Tile is just the thing if you want *especially bright colors.*

Use Flexachrome as a single color floor . . . or in an almost unlimited variety of patterns for your plant entrance foyer, general office space. Use it for an overall plant floor where bright color contrast or a high degree of light reflectancy is desired.

Both Tuff-Tex and Flexachrome floors are economical to install and can be laid over concrete or slab construction.

Both materials are easy to clean by daily sweeping and occasional washing. Both are easy and economical to maintain . . . thanks to tile-at-a-time installation.

Get in touch with your Tile-Tex* Contractor for full information on Tuff-Tex and Flexachrome floors. You'll find his name in the classified pages of your telephone book. Or write:

THE TILE-TEX DIVISION, The Flintkote Company, 1234 McKinley Street, Chicago Heights, Illinois.

The Flintkote Company of Canada, Ltd., 30th Street, Long Branch, Toronto, Canada.

*Registered Trademark, The Flintkote Company

TUFF-TEX GREASEPROOF INDUSTRIAL TILE

FACTORY
MANAGEMENT AND MAINTENANCE

APRIL 1952 IN TWO PARTS PART TWO

What the Factory of the Future Will Look Like B-83

What the Factory of the Future Will Be Made of B-90

Four Trend-Setters in Plant Building Methods B-94

How Plant Services Will Match Tomorrow's Needs B-98

Seven Significant Plants of 1951-52

THESE ARE NOT factories of the future. They're plants of today. But each of them, in at least one way, meets the needs that can be foreseen in the factory of the future. For instance, the factory of the future . . .

. . . will be quickly and easily expandable. That need came first with the men who designed the AiResearch plant.

. . . will minimize handling. The Lincoln plant was built around a storage principle that does just that.

. . . will be a comfortable plant. Even with a hot process like glassmaking, you can beat the heat — same as in the new Fiberglas plant.

All these things are important today. They'll be even more important in your factory of the future.

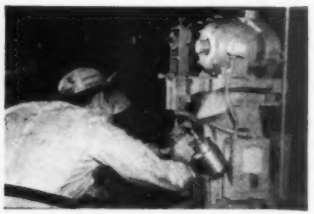
1. Designed for the Future B-102
   AIRESEARCH COMPANY OF ARIZONA
2. New Plant Inspires New Methods B-106
   BARTH STAMPING & MACHINE WORKS, INC.
3. Built to Beat Process Heat B-112
   OWENS-CORNING FIBERGLAS CORPORATION
4. Planned for Point-of-Use Storage B-114
   LINCOLN ELECTRIC COMPANY
5. It Cost Only $4.55 a Square Foot B-116
   C. O. OWEN & COMPANY
6. It's Pressurized — It's Convertible B-118
   THE RELIANCE ELECTRIC & ENGINEERING COMPANY
7. Built for Perimeter Production B-122
   CIBA PHARMACEUTICAL COMPANY

Important New Catalogs B-124

1 It's a fact! For most types of acoustical material, the manufacturers specifically recommend *spray painting*. In spraying, the millions of minute surface pores remain open; whereas other methods tend to fill them and reduce the sound-deadening qualities. The same characteristics of DeVilbiss spray equipment that make it ideal for this job can save you time, money, and inconvenience on hundreds of other jobs!

2 Spraying eliminates the tedious, tiresome chore of doing tough and complex jobs like this radiator. Work is more thorough, results smoother, too. This DeVilbiss electric outfit is complete, portable and supplies *on-the-spot* compressed air.

3 There's no substitute for spray painting on jobs like this. Rough, masonry surfaces would wear out a brush in a hurry. Spraying coats the irregular surface evenly, gets into crevices and hard-to-reach places, brings obvious savings.



4 Spray-paint machinery in a jiffy . . . coat irregular contours, and otherwise hard-to-reach places, *easily*. Let sprayed-on color brighten your plant, increase operating efficiency and safety. DeVilbiss MBC gun, paint cup, and hose (shown) cost only $48.73.

Paint 4 times faster— save up to 50% on painting costs!

If you have adequate compressed air, as little as $167.16 invested in a DeVilbiss portable spray outfit will enable you to do your own maintenance spray painting.

SPRAY PAINTING IS BETTER! Steel, brick, stucco, stone, wood—spray painting gives them all a uniform, fully covering coat. Reaches into cracks and crevices! No brush marks, either.

SPRAY PAINTING IS FASTER! Yes, up to 400% faster . . . really important in avoiding inconvenience and hold-ups. Important, too, in saving on the man-hour costs of painting.

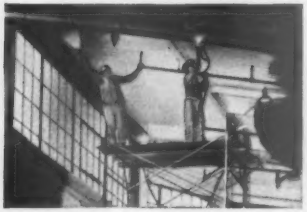
SPRAY PAINTING IS EASIER! All painting materials are easily applied—protective, adhesive, decorative, sound-deadening, fire-proofing, etc.—without dipping, daubing, stroking, wiping.

Don't wait to benefit from DeVilbiss services and spray equipment. Write NOW for more information, or call your local DeVilbiss supplier.

THE DEVILBISS COMPANY
Toledo, Ohio
Windsor, Ontario • London, England
Santa Clara, Calif.
Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY
DEVILBISS

5 In offices, restaurants, and institutions of all kinds, the spray method of painting is easier, faster, more efficient, low in cost. Even major paint jobs can be done in off-hours without interrupting business operations. Don't lose time with slow painting methods.



6 Painting a ceiling is a tough job. A spray gun makes it easier—eliminates the repeated stooping, bending, stretching and resulting fatigue. And because spraying can apply a heavier coat, one application is usually sufficient where other methods require two.

7 You may never have to paint a bridge, but many jobs have the recesses, undercuts, and latticework that make spray painting the best way. Whatever your job, you owe it to yourself to investigate DeVilbiss. Don't wait. See your local supplier today.

COMPARE...

Modine UNIT HEATERS HAVE EVERYTHING!

For heating at its best — have your representative show you a Modine Unit Heater installation. You'll notice the uniform comfort that's instantly available where and when it's needed. That's because discharge air temperature, volume and velocity are scientifically balanced.

Check fuel and power costs . . . installation and maintenance expense. Without question, you'll find all are far lower than with other heating methods.

See for yourself. *Compare* . . . and you'll choose Modine. Modine Mfg. Co., 1505 DeKoven Ave., Racine, Wis.

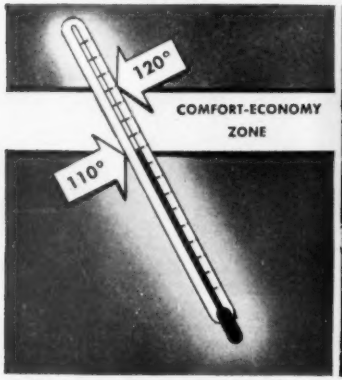
Modine UNIT HEATERS

Write for Bulletin 149-A, "Modine Unit Heating." Or contact your Modine representative listed in the classified section of your phone book.

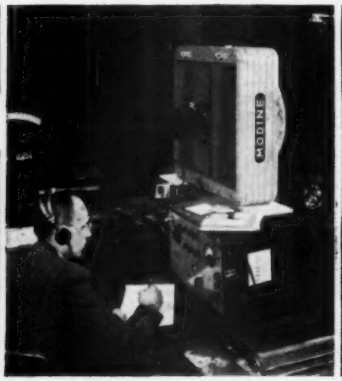
U-1118A

Vertical Delivery model shown here (available from 155 to 2550 EDR). Horizontal and Power-Throw types are also built for hot water and steam, as well as Gas-Fired units.

Three of many outstanding features that account for the Modine quality reputation



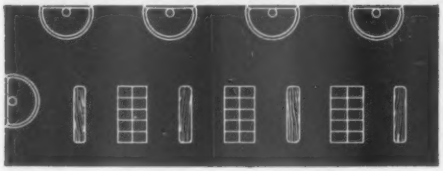
Discharge air temperatures of 110° to 120° F. are correctly related to air-velocities — assure perfect heating comfort plus lower fuel costs.



Sound-silencing features assure quieter operation — certified by accurate laboratory sound ratings. Especially important for commercial and institutional use.

Versatile control of air delivery is provided by Cone-Jet, Truncone or Louvre deflectors. You can choose the *right* one for your job at no extra cost.

Select The BRADLEYS That Suit Your Needs

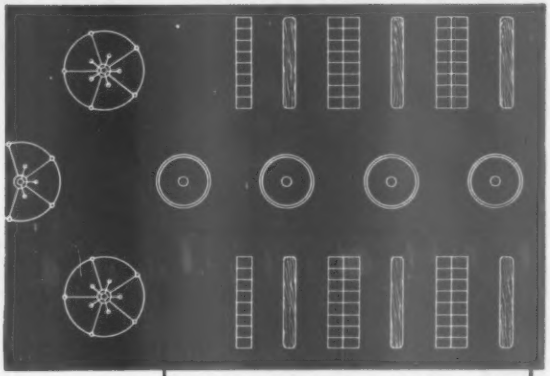


In narrow washroom areas as above—semi-circular or wall type Bradleys are well adapted. Up to six persons are accommodated simultaneously at the 54-in model.

•

At right is a combination of four 54-in. full circle Washfountains, two 5-stall and one 3-stall Bradley Showers.

•



Bradley 5-Stall Group Shower (also furnished as Column Showers without stalls).

Up to 10 persons are served at a 54-in. circular Bradley.

Each Provides The Utmost in Safe, Clean and Sanitary Washing

• Whether washing facilities are required for large groups or small, there is a sanitary Bradley Washfountain or Multi-Stall Shower that meets your exact requirement.

As the illustrations show there are 54-inch full circle models that serve 8 to 10 simultaneously, 36-inch models, wall mounting types, all furnished in various precast stone materials or enamel iron. (Stainless steel not available at present.) All have the central sprayhead in place of faucets, save space and reduce piping connections.

Bradley Multi-Stall Showers are made in 5- and 3-stall models and as a multi-person shower without divided stalls.

For the smaller washroom,—for such locations as cafeterias, laboratories, the Bradley DUO-Washfountain has the sanitary sprayhead and foot-control—(no faucets to touch).

Information and data in our revised Catalog 5204 will help you make your final selection. Copy on request. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee 1, Wis.

Women workers and girls in schools and institutions enjoy the sanitary washing features Bradleys provide. For children, juvenile height pedestals are available.

DUO-Washfountains for smaller washrooms, in groups or singly located in cafeteries, laboratories, etc.

Catalog 5204 mailed on request.

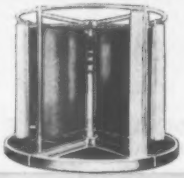
Distributed through Plumbing Wholesalers

BRADLEY Washfountains

Full circle 36-in. and 54-in.

Semi-circular 36-in. and 54-in.

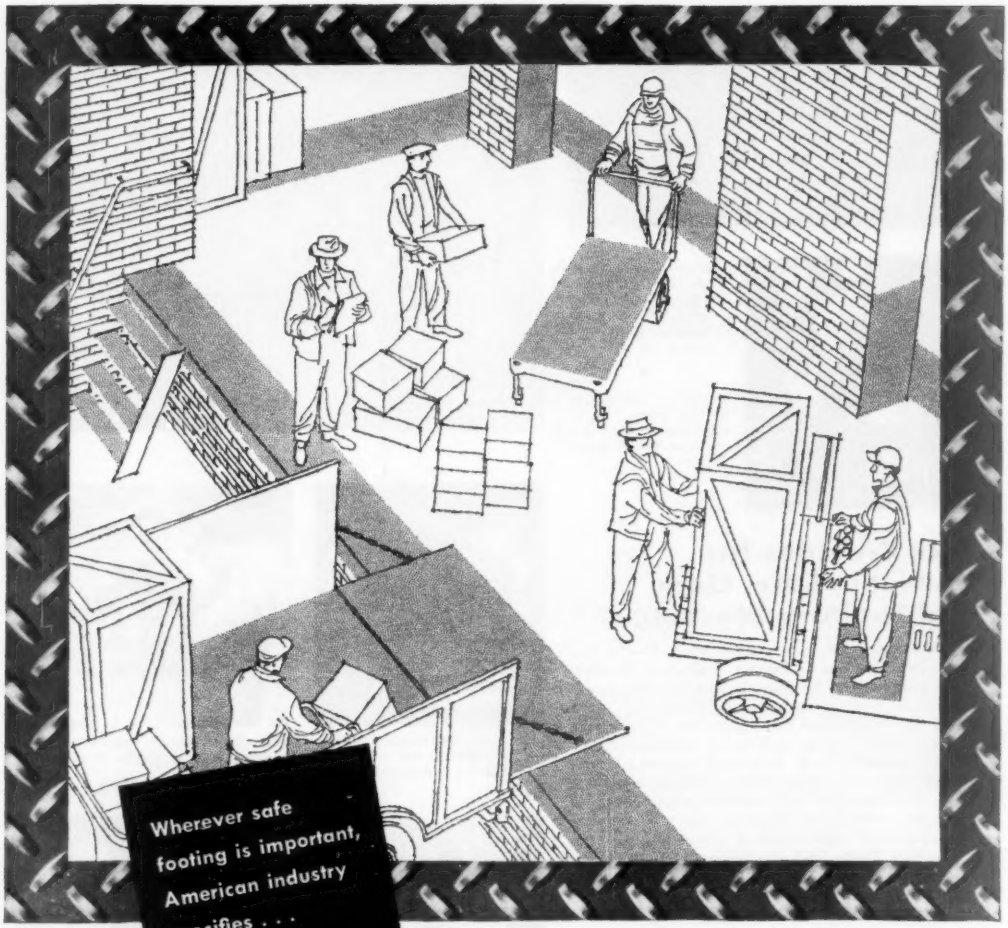
The Duo



Multi-Stall Shower

Column Shower

Drinking Fountain



INLAND 4®-WAY SAFETY PLATE

Safety pays off—in personnel, plant and product! You gain man-hours, lower insurance rates, greater fire protection and happier workers.

Each danger spot indicated above can be easily, quickly and economically made *safe* with slip-resistant 4-WAY SAFETY PLATE. It adds strength, traction and provides quick starts and stops.

Use 4-WAY SAFETY PLATE for sure footing on all danger spots in your plant and as standard equipment on your product.

Available from Leading Steel Jobbers
•
WRITE FOR BULLETIN F-1

INLAND STEEL COMPANY
38 SOUTH DEARBORN STREET • CHICAGO 3, ILLINOIS

INLAND

SALES OFFICES: Chicago • Davenport • Detroit • Indianapolis • Kansas City • Milwaukee • New York
St. Louis • St. Paul

PRODUCTS: Sheets, Strip, Tin Mill Products, Bars, Plates, Structural Shapes, Sheet Piling, Reinforcing Bars, Pig Iron, Rails and Track Accessories

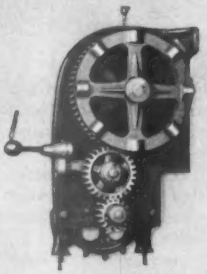
Rolling Steel DOORS

Manually, Mechanically, or Power Operated

In the openings between an enclosed loading dock and a large food warehouse illustrated below, twenty-four Mahon automatic closing, Underwriters' Labeled Rolling Steel Fire Doors were installed to protect the contents of the building. These doors are manually operated in normal service, but are equipped with fusible links and an automatic closing device which quickly closes the door in case of fire. Mahon Underwriters' Labeled Rolling Steel Fire Doors, like all other Mahon Rolling Steel Doors, occupy no usable space inside or outside the opening . . . they are built to give a lifetime of trouble-free service . . . for instance, the galvanized steel for the interlocking curtain slats of Mahon Rolling Steel Doors is chemically cleaned, phosphated, and chromated to produce paint bond, and the protective enamel coating is baked on at 350° F. prior to roll-forming. This is just one of the extra value features of Mahon Rolling Steel Doors—you will find others if you check specifications carefully. See Sweet's Files for complete information, or write for Catalog No. G-52.

MAHON STANDARD POWER OPERATOR 920-P

Mahon Release Device and Governor on the Automatic Closing Mechanism of a Mahon Rolling Steel Fire Door. Fusible links release the mechanism in case of fire and the door closes automatically.



Mahon Release Device for Chain-Gear Operator on Mahon Mechanically Operated Rolling Steel Fire Doors. Fusing of the Fusible Link, which releases the Automatic Closing Mechanism, simultaneously disengages the Chain-Gear Operator.

THE R. C. MAHON COMPANY

Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Doors and Fire Shutters; Insulated Metal Walls; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Twenty-Four Mahon Automatic Underwriters' Labeled Doors installed in a new Warehouse for Food Warehouses, Inc., Detroit, Mich. Two Mahon Power Operated Rolling Steel Doors 17'-0" x 22'-0" are installed in railroad openings in this same building. Louis G. Redstone, Architect, Campbell Construction Company, General Contractors.

MAHON

Lick Your Window Maintenance Problems

. . . get *Fenestra* Super-Galvanized Steel Windows

Steel windows have the strength and rigidity that no other windows can match. And now Fenestra has even eliminated maintenance *painting!* Insist on Fenestra* Super Hot-Dip Galvanized Steel Windows.

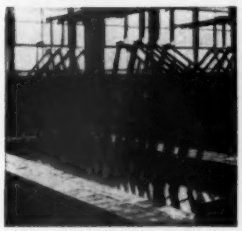
Here's why they are called *Super* Galvanized: Fenestra has developed a Hot-Dip Galvanizing system designed specifically for steel windows and built a special plant around it. It is the only one of its kind in America.

In Fenestra's new plant, completely automatic controls move Fenestra window assemblies through a series of special tanks where they are cleaned and pickled, rinsed, fluxed, dried, galvanized and Bonderized. Timing, temperatures—every step—is laboratory controlled.

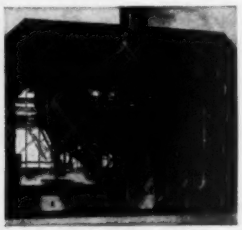
So add Super Hot-Dip Galvanizing to your present list of Fenestra advantages . . . such as integral ventilator butts that increase window strength, precision machining of window bars for perfectly uniform window size, automatic assembly of ventilators for perfect permanent fit, continuous double contact for weather-tightness all around vent openings, rigid *interlocking* muntin joints.

And, remember, Fenestra's volume production, permitted by standardization of types and sizes, gives you high-quality Fenestra Steel Windows at remarkably low cost.

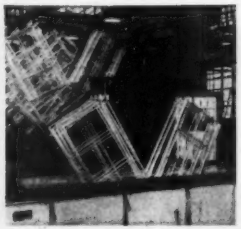
Call your Fenestra Representative or write Detroit Steel Products Company, Dept. FM-4, 2266 East Grand Blvd., Detroit 11, Michigan. *®



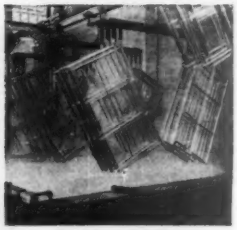
FLUXING. After cleaning, pickling and rinsing, Fenestra Windows dip into a flux bath that provides a film to prevent contamination of the cleaned steel as it passes to galvanizing tank.



DRYING. In this oven, the flux is dried on. Of course, in the galvanizing tank, this protective coat of flux volatilizes on contact with the molten zinc to permit a strong zinc-iron bond.



GALVANIZING. Assemblies dip deep into molten zinc, and come up with a thick, smooth, uniform coating. Temperature and timing are automatically controlled with laboratory accuracy.



BONDERIZING. Here you see the galvanized assemblies being Bonderized to give the surface a soft silver color and to provide a holding surface for decorative paint, if it is ever desired.

Fenestra

SUPER HOT-DIP GALVANIZED STEEL WINDOWS

from America's first plant especially designed to galvanize steel windows

for future economy

CHICAGO PNEUMATIC

equips its modern plant at Utica with JENKINS VALVES

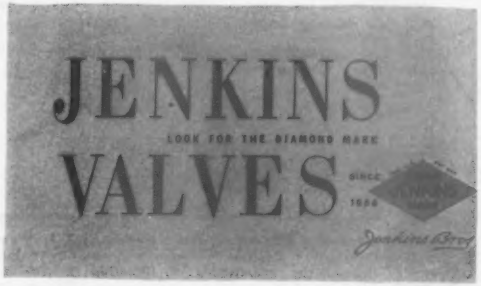
Architects, Design Engineers and General Contractors
WALTER KIDDIE CONSTRUCTORS, INC.
Heating Sub-Contractor
COURTER AND COMPANY, INC.
Plumbing Sub-Contractor
EDWARD B. KEARNEY COMPANY, INC.

Chicago Pneumatic Tool Co., which can look back with pride upon fifty years as manufacturers of pneumatic and electric tools, believes in looking ahead as well. Good example of this is the consideration given to future operating costs at the Company's newest plant at Utica, N. Y.

To insure lasting efficiency and maintenance economy, Jenkins Valves were installed throughout the plant on the recommendation of the architects and design engineers. These men, like so many of today's top-flight building specialists, know that the *extra measure* of efficiency and endurance built into Jenkins Valves pays dividends.

Despite this extra value, *you pay no more* for Jenkins Valves. For new installations, for all replacements, let the Jenkins Diamond be your guide to lasting valve economy. Jenkins Bros., 100 Park Avenue, New York 17; Jenkins Bros., Ltd., Montreal.

JENKINS VALVES ARE STANDARD at Chicago Pneumatic's new Utica plant. More than 1500 are in service on air, steam, water, sanitation and other essential pipelines. Above, Jenkins Valves control pipelines serving three return pumps in the boiler house. View at left, above, shows the Administration Building at the front of the 12-acre manufacturing plant.



SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

"HET UP" about YOUR wasteful heating SET UP?

Why not change to

THERMOLIER
UNIT HEATERS

If you're dismayed about *last winter's* high-cost-of-heating, how about next year — when it may be as hard to get *fuel*, as it was for you to get *heat* this year?

Here's a red-hot tip. To save heat and fuel, install Thermolier Unit Heaters. But don't delay. Material shortages can seriously disrupt the production of unit heaters. In addition, skilled men are available to make installations now. They may not be in the days ahead. Study these Thermolier Unit Heater advantages — *and act promptly.*

HEATING COMFORT Thermoliers provide quick heating from a cold start. Desired room temperatures are easily maintained within a close range.

LOW FIRST COST Thermoliers are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost.

ECONOMY OF OPERATION Heat is forced down to the working level . . . not banked uselessly at the ceiling level.

ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT Thermolier unit heating is widely used in industrial plants and warehouses, garages, stores and public buildings. The units and the simple piping are overhead where they do not interfere with arrangement of the operating machinery or equipment.

THERMOLIER CONSTRUCTION FEATURES THAT SAVE MONEY

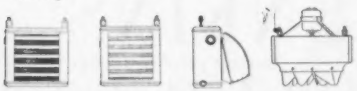
Use of plain thermostatic trap, the simplest and least expensive kind of trap, is practical because of Thermolier's exclusive internal cooling leg.

Maximum capacity provided at all times and annoying, destructive water hammer eliminated by built-in pitch of tubes and internal cooling leg which assures continuous drainage of condensate.

Damaging strains caused by expansion and contraction eliminated by "U" type expansion tubes.

Safety and durability assured with leak-proof tube-to-header construction.

Eight other important features. Write for Thermolier Catalog.



Horizontal Delivery | Textile Model | Velocity Nozzle | Vertical Delivery

GRINNELL
WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

TOUGH FLOORS FOR TOUGH CONDITIONS

BLUE ● TEMPER **FLOORS**

In your plant you can have dense, ductile heavy duty floors, showing no noticeable wear for long periods and involving practically no upkeep costs, even when subjected to abrasive traffic and shock. Such floors are constructed with Ferem, the "Blue Temper" component in the floor topping, replacing sand, stone and silica. Ferem is used in heavy duty floors, loading platforms, corridors and runways in newly constructed buildings, or when replacing worn or eroded floors. Ferem is resistant to the corrosive action of chemical solutions . . . and has proven satisfactory under the wet floor conditions of many industries.

Smith Dairy Products Co.
Bottling house of Miller Brewing Co.

USED BY

Breweries, Beverage Plants
Distilleries
Dairies
Packing Houses
Canning Plants
Chemical Plants
Industrial Plants
Municipal Plants
Paper Mills
Railroads

HORN

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Manufacturers of materials for building maintenance and construction
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Please send me ☐ complete data on FEREM FLOORS

HORN

☐ free copy of your 96-page Construction Data Handbook

FM-2

NAME_____ TITLE_____

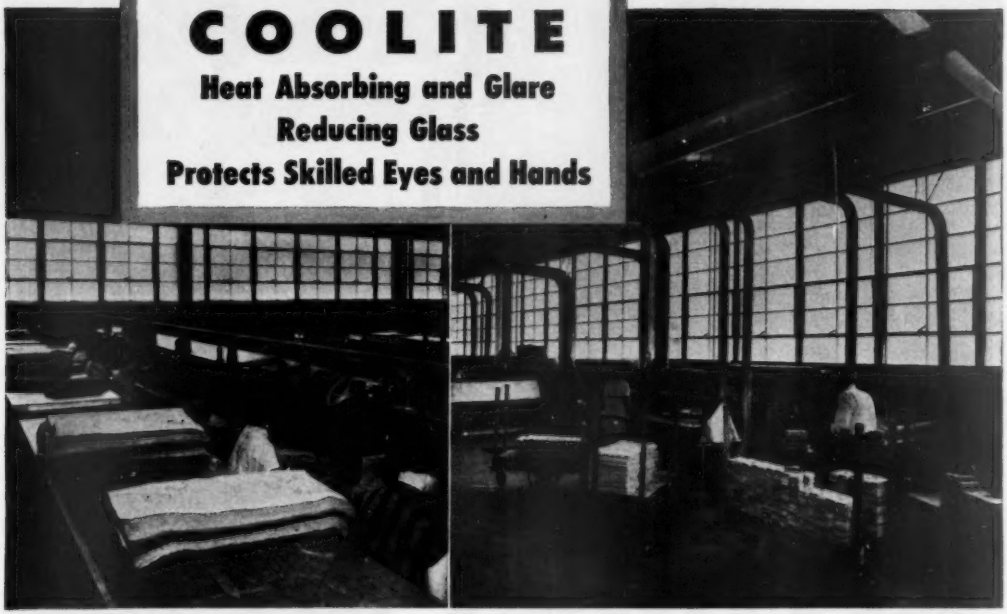
FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

Craftsmanship calls for COOLITE

Heat Absorbing and Glare Reducing Glass Protects Skilled Eyes and Hands



Architect—J. N. Pease & Co., Charlotte, North Carolina
General Contractor—Inge-Hayman Construction Co., Inc., Dallas, Texas
Glazing Contractor—Pittsburgh Plate Glass Co., Charlotte, North Carolina

Kroehler, Famous Name in Furniture, Chooses COOLITE GLASS by Mississippi

Kroehler Manufacturing Co. safeguards the high quality of its famous furniture by flooding workrooms with filtered daylight. Three exposures in this modern factory are glazed with 5800 square feet of Coolite, Heat Absorbing and Glare Reducing Glass. The precise workmanship of the woodworking shop and careful skill of the sewing department would be difficult to maintain under the eye-fatiguing glare of raw sunlight. But Glare Reducing Coolite strains out the unwanted properties in natural light . . . floods rooms with softened illumination that aids seeing tasks . . . keeps interiors more comfortable by helping to absorb solar heat rays.

Coolite has a refreshing, cool, blue-green color, modern in appearance. It reduces maintenance . . . no painted windows, makeshift shields or bothersome blinds. If you are planning new construction or modernizing existing facilities, investigate Coolite. See how it can provide increased efficiency and economy for you. Get in touch with your nearby Mississippi Glass distributor today.

Mississippi offers a wide variety of patterns in translucent, figured and wired glass. All are scientifically designed to distribute daylight to best advantage. "Visioneer" your buildings with glass by Mississippi.

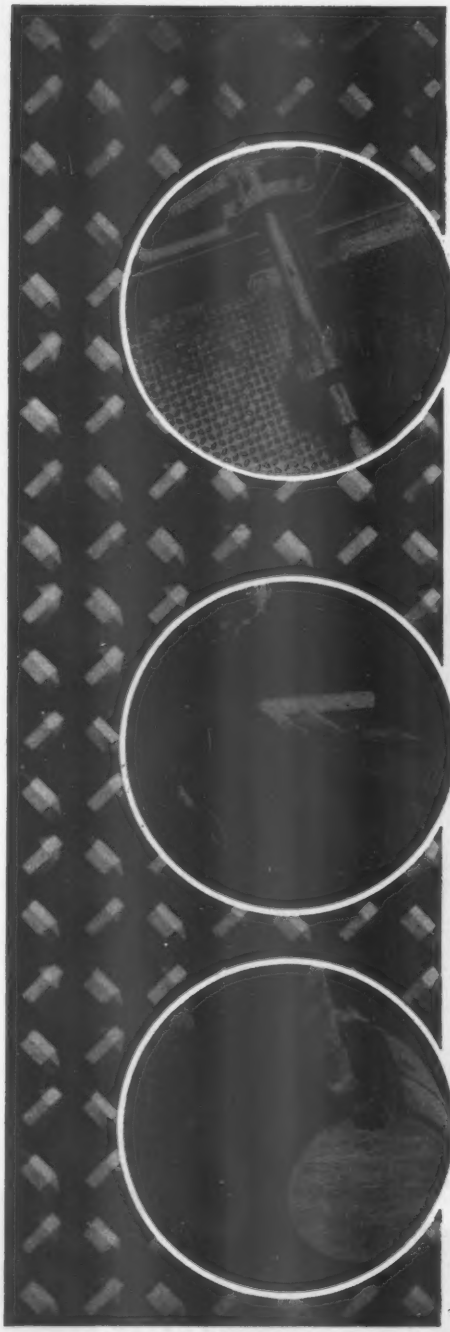
Send for free catalog, "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

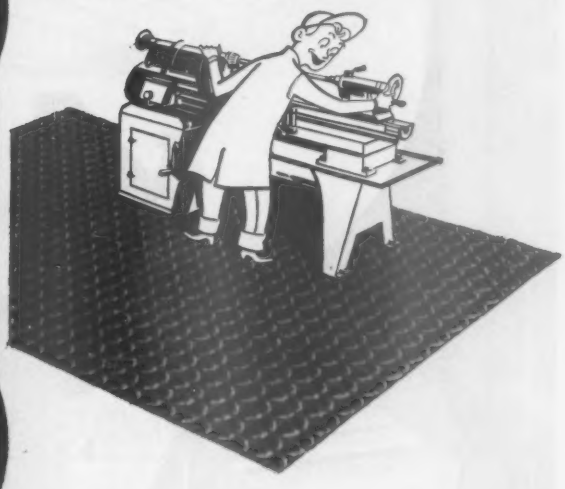


"On machinery steps and platforms—
Wherever it is put—

Multigrip, the non-skid plate
Means safety underfoot.

The flat-topped risers of Multigrip
Are easy on the feet . . .

And as for durability
It simply can't be beat!"



SKIDPROOF . . . AND COMFORTABLE UNDERFOOT. U·S·S Multigrip Floor Plate is so designed that several scientifically-shaped risers grip the foot at all times. There are no sloping edges to catch the toe of a shoe . . . no long surfaces to slip on.

The symmetrical pattern of Multigrip allows neat, continuous installations and keeps cutting waste to a minimum. It can be joined side to side, end to end, or side to end without affecting the direction of the pattern. Multigrip can be bent, formed and generally fabricated by all the usual methods.

UNITED STATES STEEL COMPANY, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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U·S·S multigrip

FLOOR PLATE

Sold by leading distributors from coast to coast

UNITED STATES STEEL

Craftsmanship calls for COOLITE

Heat Absorbing and Glare Reducing Glass Protects Skilled Eyes and Hands

Architect—J. N. Pease & Co., Charlotte, North Carolina
General Contractor—Inge-Hayman Construction Co., Inc., Dallas, Texas
Glazing Contractor—Pittsburgh Plate Glass Co., Charlotte, North Carolina

Kroehler, Famous Name in Furniture, Chooses COOLITE GLASS by Mississippi

Kroehler Manufacturing Co. safeguards the high quality of its famous furniture by flooding workrooms with filtered daylight. Three exposures in this modern factory are glazed with 5800 square feet of Coolite, Heat Absorbing and Glare Reducing Glass. The precise workmanship of the woodworking shop and careful skill of the sewing department would be difficult to maintain under the eye-fatiguing glare of raw sunlight. But Glare Reducing Coolite strains out the unwanted properties in natural light . . . floods rooms with softened illumination that aids seeing tasks . . . keeps interiors more comfortable by helping to absorb solar heat rays.

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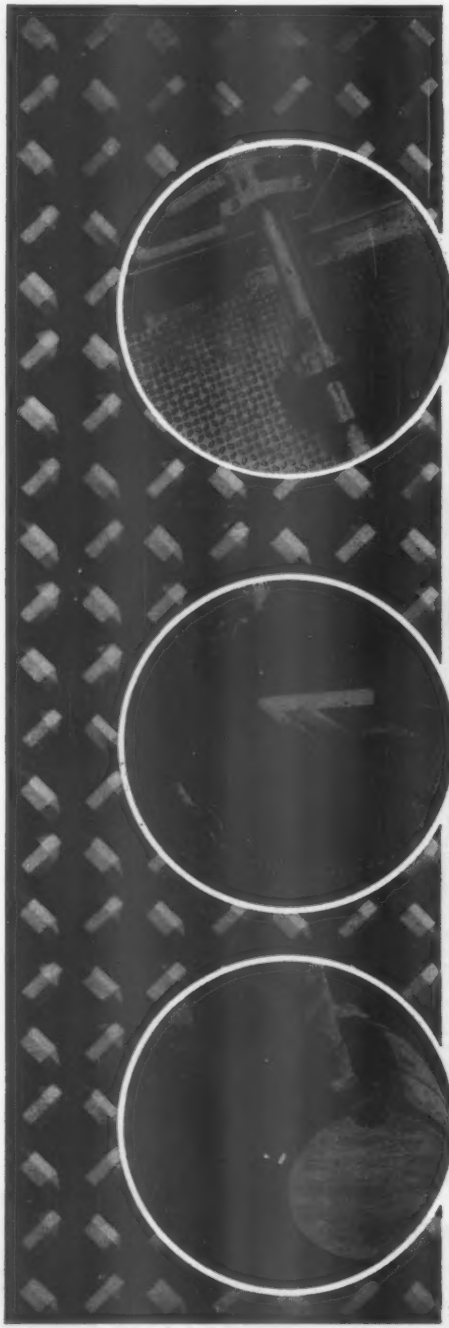

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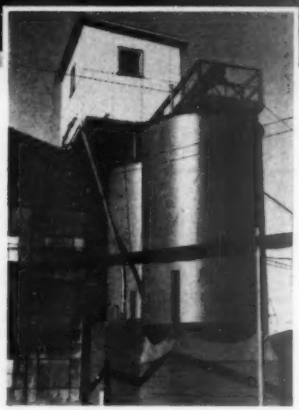
DRACCO PERFORMANCE-PROVED EQUIPMENT FOR PROCESS INDUSTRIES



TOXIC CONDITIONS ELIMINATED
...at a Profit!

A Dracco Pneumatic Conveyor is the obvious answer for handling your toxic or hazardous bulk materials safely and swiftly—with savings!

This modern technique is being used by an eastern manufacturer of insecticides for handling lime, lead oxide, and crude arsenic. The Dracco system replaced slow wasteful manual methods which exposed workmen to burns, poisoning and injury. These conditions were eliminated by the Dracco Pneumatic Conveyor, which has more than paid for itself in labor and cost savings.

Designed for flexible operation, the pneumatic conveyor was Dracco-engineered to the exact job requirements of this plant. The dual-unit system unloads railroad cars and transfers materials from primary processing or storage to final processing at five tons per hour.

This is only one of many installations where automatic, high-efficiency Dracco Pneumatic Conveyors are solving difficult materials handling problems. Dracco engineers are at your service to apply these modern, cost-saving methods to your specific problem.

DRACCO CORPORATION

Harvard Avenue and East 116th Street • Cleveland 5, Ohio

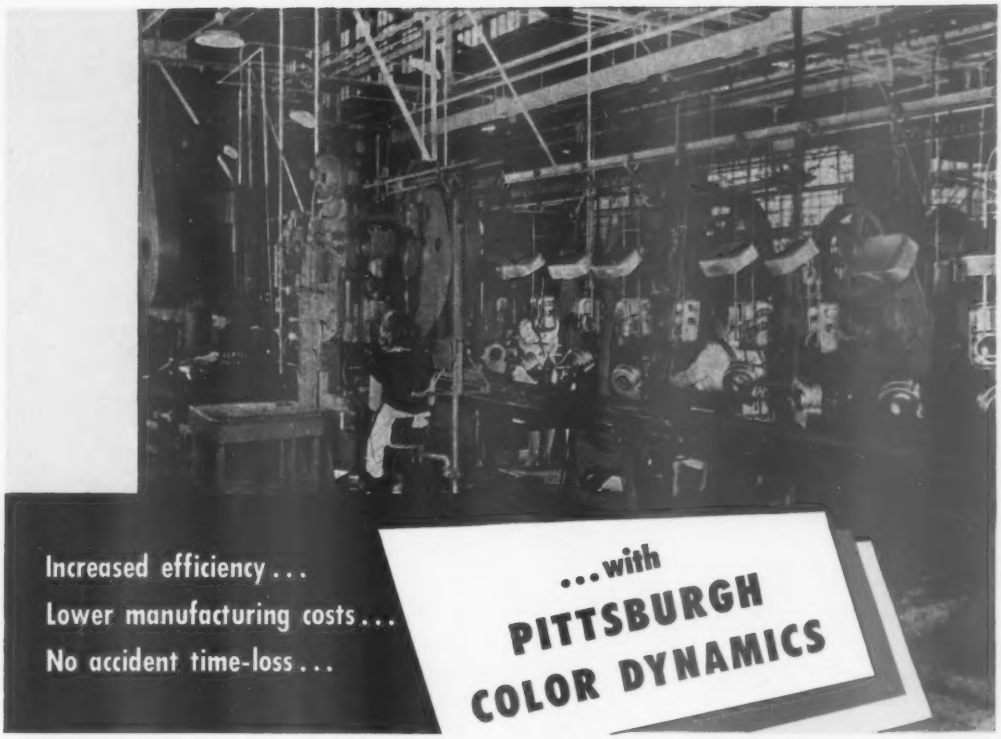
Consult your nearest Dracco representative or write Dept. F-4, Cleveland 5, Ohio, for specific information on Dracco Equipment.

(Upper photo)—Aerial conveying line (top left) moves materials from primary processing to storage or final processing in a Dracco Pneumatic Conveyor system at eastern insecticide plant.

(Lower photo)—Reclaim lines transfer materials from storage to final processing. Versatile system also unloads railroad cars, moving materials to storage or processing.

DRACCO *Performance Proved*

DUST CONTROL EQUIPMENT • PNEUMATIC CONVEYORS



Modern painting system brings benefits to management and workers alike in Automotive Heater Division of Eaton Manufacturing Company

EATON Manufacturing Company of Cleveland, Ohio, is proving—by actual experience—how Pittsburgh COLOR DYNAMICS benefits management and workers alike as it *increases the amount of work per man-hour and the number of man-hours per worker.*

● **Eaton produces** a variety of parts for the automotive industry. Its vast truck and car heater plant is one of the world's largest.

Late last year this entire heater plant was repainted according to COLOR DYNAMICS. Following the principles of the *energy in color, focal* colors were painted on operating parts of machinery and *eye-rest colors* on stationary parts to aid workers to see their tasks better and to reduce eye fatigue. Walls and ceiling were finished with *morale-building* colors to provide additional eye-rest areas. *Safety* colors were used to reduce accident hazards.

● **"As a result of repainting** according to COLOR DYNAMICS", reports W. A. Mattie, superintendent of the Heater Division, "we have noticed improvement in operating efficiency, employee morale and general plant cleanliness.

"When our plant was a dull gray, workers seldom bothered to pick up small parts used in assembly operations. They were usually swept up and discarded. Today, employees are so proud of their clean surroundings they pick up these items, effecting worth-while savings for us.

● **"By increasing** our efficiency, COLOR DYNAMICS has helped us to cut manufacturing costs. We think the 20 percent reduction in absenteeism is also directly traceable to the new color plan. Nor have we had a single hour of lost time because of injury since we repainted."

COLOR DYNAMICS Engineering Study for your plant FREE!

For a complete explanation of what Pittsburgh COLOR DYNAMICS is and how it works in industry get our free, profusely illustrated booklet.

Better still, let us show you exactly how to apply it in your plant. We'll be glad to submit a scientific color engineering study FREE and without obligation.

There's a trained color expert at each of our offices located in all principal cities. Call your nearest Pittsburgh Plate Glass Company branch and arrange to have our COLOR DYNAMICS representative see you at your convenience. Or send the coupon below.

SEND FOR A COPY OF THIS BOOK!

Pittsburgh Plate Glass Co., Paint Div.,
Department F-42, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your Booklet *"Color Dynamics In Industry."*

☐ Please have your representative call for a Color Dynamics Survey of our properties without obligation on our part.

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It's what's up here that counts!

We really aim to do our job of freight transportation so well that you'll continue to route freight our way, year after year.

That kind of service means putting to good use ***for you,*** the experience gained throughout many years in handling freight for shippers and receivers in your particular industry.

A railroad must not only have the equipment and facilities to give you fast, dependable service but also have traffic representatives who understand and speak your language. In short, "it's what's up here" that counts. We'll be very pleased to serve you at any time.

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Need passenger reservations? All departments of Union Pacific work closely together. The representative you know will be glad to help you with your travel problems.

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A Special Section on

Electrical Equipment for the 1952 Plant

With a foreword by J. W. St. ANDRE, Electrical Editor, FACTORY

HIGHER-VOLTAGE SUBSTATIONS

Let's look at the plant that up to now has been serviced by small transformers hung on poles outside the plant. New tools to turn out products in the volume required call for the use of more electrical power. It now has to come from a new substation too big to hang from a pole. It must be located on the ground either inside or outside the building. And in most cases it will have to be purchased by the plant itself.

Even plants that have had large power demands in the past are taking on new tasks. Many are now taking power at 115,000 volts. Those that use to take it at 2300 or 4160 volts direct from the power company now find the power company can no longer supply the amount of power they now need at those lower voltages. New substations at 34,000 volts must be put up.

Another reason for higher-voltage substations is the present trend of industrial plants to locate in rural areas outside the limits served by the power companies' normal distribution systems. The farther out in the country you locate your new plant, the higher the voltage at which you may expect to receive your power from your local utility. After all, line losses must be absorbed by the power company – which means it's going to use the highest voltage that is practical to serve you.

FIRM POWER

It's a *must* in many industries. Processes are now becoming more and more complicated and continuous. A power outage will not only represent loss of output. It may also result in heavy damage to the product and machinery.

Take chemical processes. Liquids will solidify in pipes if the pumps are shut down for a few minutes. Or take today's big transfer machines. They may break hundreds of tools if interrupted when the drills are in the cutting cycle.

You can't afford such power failures. The answer is dual power supply, with automatic switching. Where the power company, for one reason or another, can't allow you to run with the two incoming feeders tied together, automatic throw-over switches with a slight time delay may be possible. In that case your equipment must have hold-in devices that will keep your control from dropping out on the short power outage between operation of two circuit breakers.

Be sure you have the proper relaying to do this job of automatic switching. This is no place to economize. Provide for all the faults that may call for switching operation.

OUTSIDE LIGHTING

Boundary lighting for property protection will always be a *must*. More and more plants are using outside storage for materials that are not damaged by the weather. The idea is to free floor space. Somehow our buildings are never big enough.

And don't forget the parking lots. Employees like to feel their cars are protected by good lighting. Thieves seldom operate where people can see them. And who likes to wander around in the dark at 1 a.m. on a cold wintry night, lighting matches to locate his car?

How about your guard houses? Are they equipped with powerful searchlights? Can your guards properly cover every foot of their posts?

You'll want small electric heaters for guardhouses. And 480-volt lines to these outposts. A small air-cooled transformer will provide power for the heater and the lighting.

"Walkie-talkie" hand sets will enable your guards to report while on patrol. If you have a lot of "blind" areas that cannot be seen from the guard post, an industrial television system might well be your answer.

INSIDE LIGHTING

Good lighting is not a luxury any more. Lighting levels are rising all the time. Closer tolerances demand better vision. The place to stop scrap is where it is being made—not on the inspection benches.

Fifty foot-candles are now common. Office lighting is going even higher. Lighting engineers are thinking more and more about worker comfort. Color of lighting sources, design of fixtures, and lighting layouts are important, too.

Light sources are improving every day. Fluorescent lamps now last three times as long as they did not too many years ago. With 8-ft. lamps, you need fewer fixtures. And the newer installations are instant-starting and operate at all temperatures.

Cold cathode lamps offer long life. We're seeing more mercury lamps. By using fluorescent powders, the cold light so objectionable in straight mercury lamps has been warmed up. Reflector lamps cut down on maintenance.

High-voltage lighting – using a 265-volt system with low-voltage relay for switching – has lots of possibilities. Uses less critical material. Saves money on installation.

The new method of using the 480-volt power distribution system for supplying lighting is practically a *must* today. With small air-cooled transformers placed near the light centers, you can use high voltage with its lower power losses.

And don't forget group replacement. That'll save you money. Remember lamp costs are going down while labor costs for changing the lamps are forever going up.

POWER DISTRIBUTION

Unit substations enable you to use voltages up to 15,000 volts from your main substation to various load centers in the plant. At that point the voltage is stepped down to 480 to run your machine tools and other equipment. New plants all use this system of distribution. Old plants have to convert if they want an efficient system.

Of course, you must get this high voltage from your main substation to the unit substations. The old way was to bury the cables. The new way is to string cable overhead in conduit or use interlocked amored cable. It's a lot easier to locate faults and make repairs.

Meters are more important today than ever before. They tell you not only *how much* power you're using, but also *where* you're using it. That's vital as you use more and more power. It helps you avoid overloads. It enables you to allocate power charges properly.

Modern switchgear must have its full complement of meters and instruments if it is to do its job according to today's standards. The time to get these meters and instruments is when you buy the switchgear. Installing them later may be costly – or even impossible.

More and more plants are using bus duct. It's the best way to handle long runs of heavy current. It's useful for taking off branch feeders to service machine tools. But remember, you can't bend bus duct. Bends have to be made by the manufacturer.

Conduit is still very much in use. Your plant electricians are old hands at bending and fitting conduits around all sorts of obstructions. Handling bus duct, especially the large sizes, is no job for two men. Supports are also a problem. Mechanical problems crop up in designing such supports. The average electrician would rather install conduit. But don't rule out bus on that account. Both bus and conduit can sometimes be used effectively in the same distribution system.

Now about wire. On old installations the capacity of the system can often be increased by installing new wire with insulation that will enable you to carry more current with the same-size copper. That means you won't have to make any changes in your present conduit set-up. Oil- and heat-resistant insulation may be hand for those trouble spots. Some cable can be buried right in the ground without any protection such as conduits or lead jackets.

AUTOMATIC CONTROLS

More and more machine tools are being equipped with automatic controls. The pushbutton factory may be "just around the corner." Controls on some machine tools are becoming part of operation specifications. Resistance welding is a good example. In the welding of aircraft parts made of aluminum, government specifications call for certified welds that must be controlled by foolproof pre-set electronic controls. All the machine operator does is handle the work material and step on the pedal. The control panel is kept under lock and key.

Speaking of electronics, there is a certain amount of opposition to electronic controls in industry. A lot of plant people go 'round saying if there is another way to do it, let's do it that way. That's poor thinking. Just because the automatic transmission on your car is hard to understand and fix when it goes wrong is no reason why you should go back to horses.

If you are getting equipment with electronic controls on them, or if you need such controls, why not get smart and get some electronic maintenance men on your payroll? Make sure you get good electronic controls and that the manufacturer spends some time with your maintenance department. Too often the controls get blamed when the fault lies in poor maintenance or lack of operating knowledge.

D-C CURRENT

There's a real trend toward d-c current. The d-c motor is so useful when it comes to adjustable speed control, electrical braking, and smooth acceleration. The machine tool industry, for instance, is using packaged units to get d-c current right where it is being used. Transmission trouble was the main reason why industry stopped using d-c power. With the new units you combine the distribution advantages of an a-c system with the desirable characteristics of d-c motors and controls.

For distribution of large amounts of d-c power or for plants that have d-c distribution systems, there are rectifiers made in all sizes and shapes. Again you may take advantage of high-voltage a-c supply and spread your rectifiers around like unit substations for a-c.

* * *

All of the equipment I have described is wonderful. But it needs attention. As you build up your power distribution system to take care of greater electrical loads, so you will have to build up your electrical force to take care of this equipment.

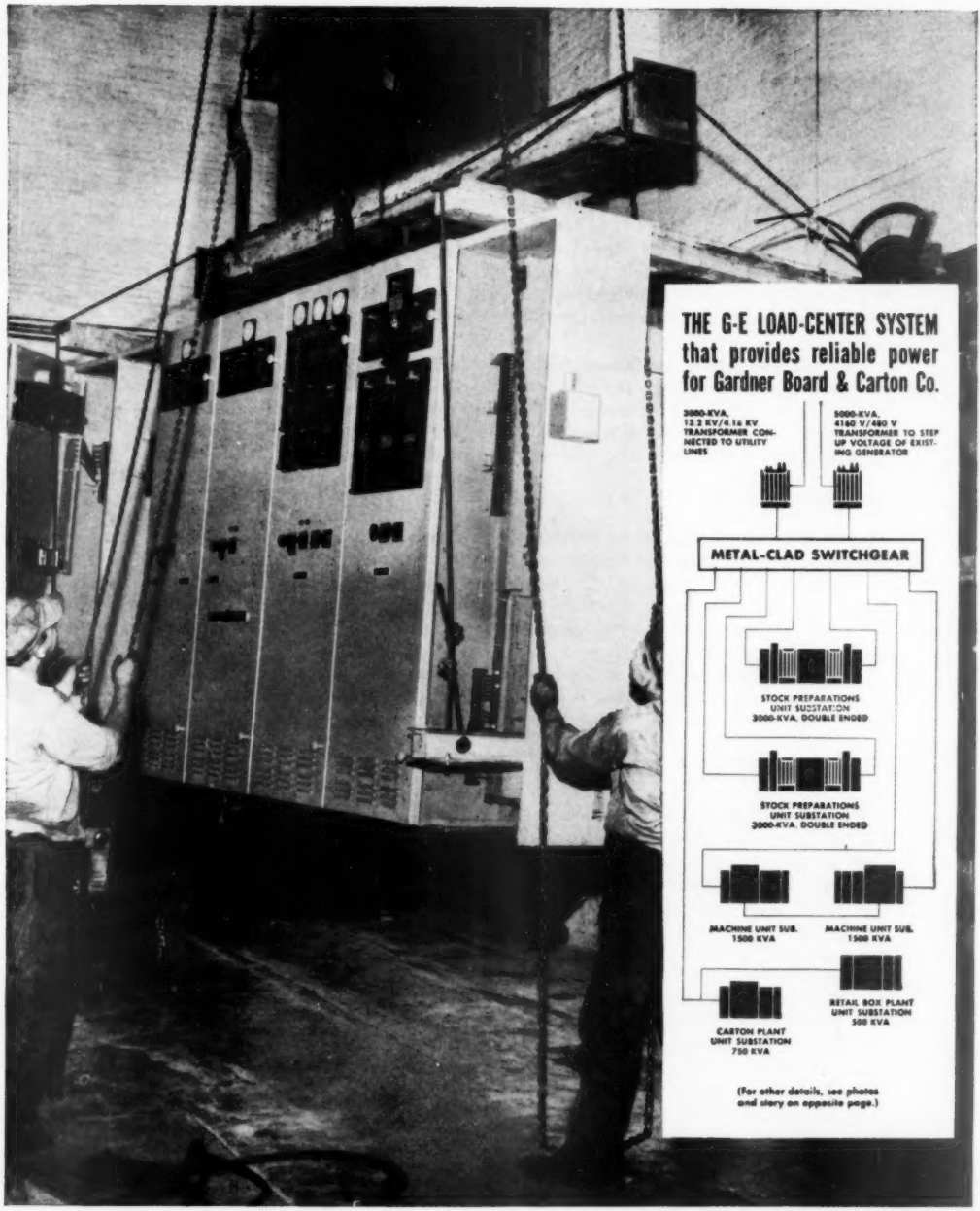
Your new electrical department must be staffed with highly skilled electricians. Their know-how must come out of instruction books and diagrams. They can't get it in the old learning-by-doing school. In the first place, you can't wait for them to learn that way. Second, they'll never be able to memorize all the complicated control schemes they run into. So you'll have to depend on very general trouble-shooting methods backed up by quick fault-location diagrams to get the machines back on the line as soon as possible.

Your high-output machines will produce only so long as you keep them supplied with reliable and trouble-free electrical power. Get the best electrical equipment you can afford. Take advantage of ever-improved design and operating methods. And get yourself a well-trained electrical operating force. With the right equipment and the right men, you'll be well up in front in the race for high production at lower cost.

Now turn the page to find out what's new and best in electrical equipment — and who makes it

B-22

Ohio plant avoids shutdowns with


THE G-E LOAD-CENTER SYSTEM
that provides reliable power
for Gardner Board & Carton Co.
3000-KVA, 12.2 KV/4.16 KV TRANSFORMER CONNECTED TO UTILITY LINES
5000-KVA, 4160 V/480 V TRANSFORMER TO STEP UP VOLTAGE OF EXISTING GENERATOR
METAL-CLAD SWITCHGEAR
STOCK PREPARATIONS UNIT SUBSTATION 3000-KVA, DOUBLE ENDED
STOCK PREPARATIONS UNIT SUBSTATION 3000-KVA, DOUBLE ENDED
MACHINE UNIT SUB. 1500 KVA
MACHINE UNIT SUB. 1500 KVA
RETAIL BOX PLANT UNIT SUBSTATION 500 KVA
CARTON PLANT UNIT SUBSTATION 750 KVA
(For other details, see photos and story on opposite page.)

G-E FACTORY-ASSEMBLED POWER EQUIPMENT IS EASY TO INSTALL. HERE MEN LOWER MAIN SWITCHGEAR SECTION INTO PLACE.

"Electrical Equipment for Today's Plant"

G-E load-center power system

Like many other growing plants, the Gardner Board and Carton Co. found they needed more power. They realized, too, a pressing need for more protection against power-failure shutdown than they had with their old-type 480-volt distribution system.

How they did it: With the help of General Electric engineers, Gardner completely replaced their old 480-volt system with a modern 4160-volt G-E load-center system. Compact, metal-enclosed unit substations now give them plenty of power—and plenty of protection against power shutdowns too. A secondary-selective system provides duplicate sources of power for substations supplying the most vital plant loads. Metal-enclosure of all live parts—and modern breakers with plenty of interrupting capacity—give further protection both for production and for plant personnel.

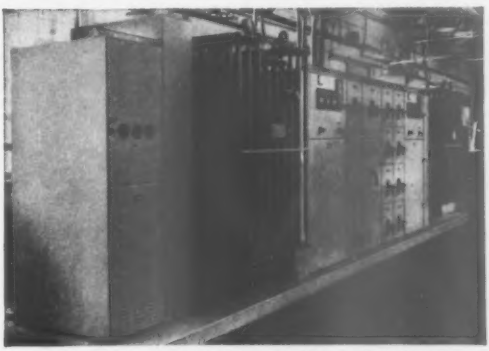
Improves Voltage—Saves Copper—Flexible for Future

By taking high-voltage power directly to load centers, long secondary circuits are avoided, and plant voltage improved. The tons of extra copper that would have been required to expand the old 480-volt system were saved. And the plant electric system now has great flexibility for the future. Additional substations can be added easily, quickly, economically. Existing ones can be easily moved to follow load shifts.

For further information on G-E engineered load centers, call on your local G-E sales representative, or write for GEA-3592, General Electric Company, Schenectady 5, N. Y.

G-E "Project Co-ordination" praised by Chief Engineer

"Many costly man-hours were saved for us by G-E over-all co-ordination," says Arthur Harvey, Chief Engineer of Gardner Board and Carton Co. "From planning to final installation, G.E. co-ordinated all equipment and delivery details whereas Gardner men installed the equipment. The effect on our production during this period was negligible." In photo above, Mr. Harvey discusses over-all plan submitted by General Electric with Mr. J. M. Popp, G-E sales engineer. A simple outline of this plan is shown in chart on opposite page.



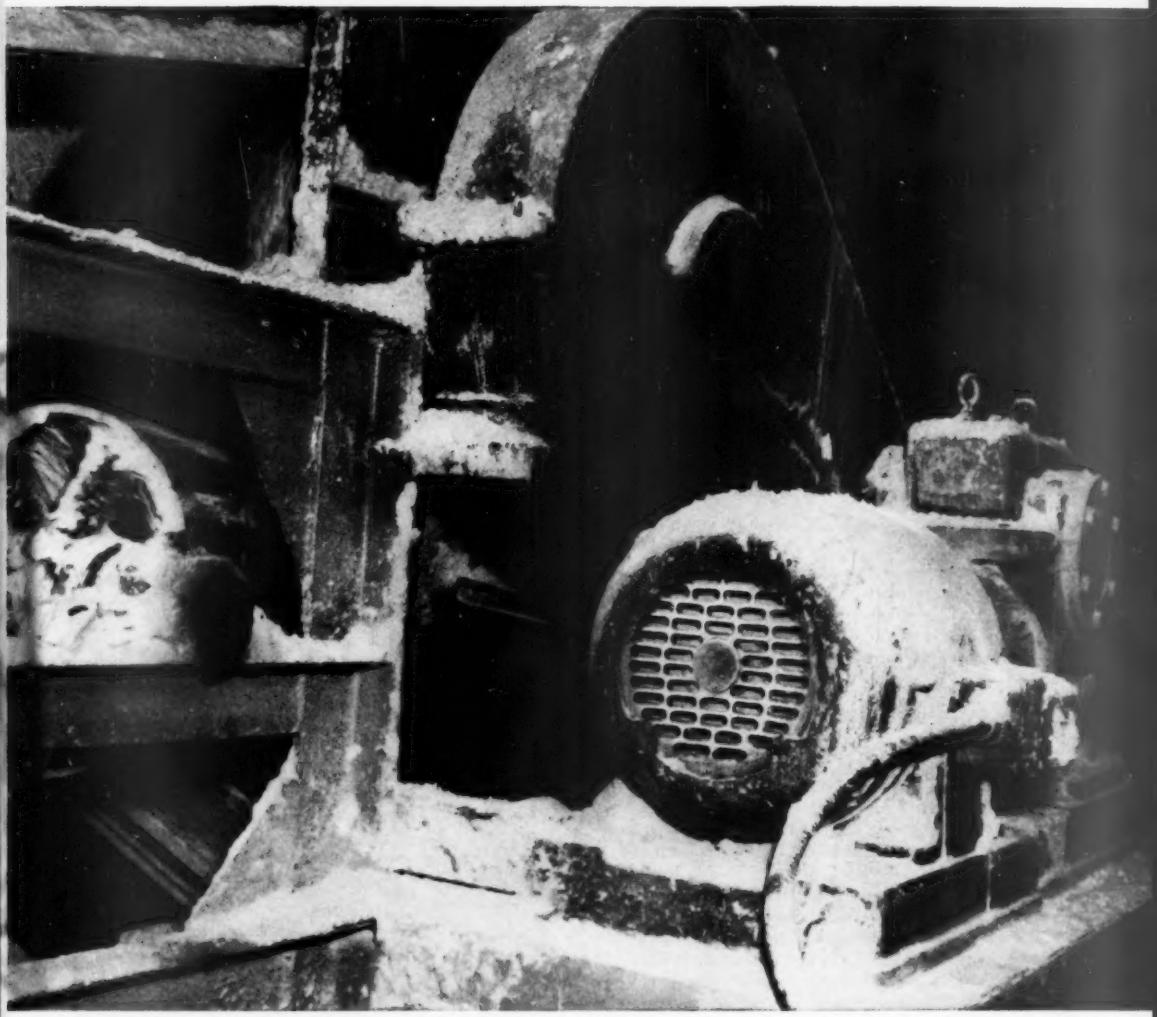
Compact Double-ended Load-Center Unit installed close to load. Ratings: 3000 kva, 4160/480 v. Drawout breakers are easy to inspect, have plenty of interrupting capacity. Note G-E "Interlocked Armor" cables, which provide metal-enclosed circuits with lower material and installation costs.

GENERAL ELECTRIC

321-78

"No Plant is Better than its Electrical Equipment"

INDUSTRY DOES THE



THE CHEMICAL INDUSTRY depends on standard, "off the shelf," Tri-Clad motors in the most adverse operating conditions, including corrosive, abrasive and explosive atmospheres. The 7½-hp totally-enclosed fan-cooled Tri-Clad motor above drives a crude ash conveyor an average of over 23 hours every day.

GENERAL ELECTRIC

752-12

"Electrical Equipment for Today's Plant"

TOUGH JOBS WITH TRI/CLAD MOTORS

REG. U.S. PAT. OFF.

EXTRA PROTECTION

Every Tri-Clad motor, open or totally-enclosed, is triply-protected against *physical damage, electrical breakdown* and *operating wear and tear.*

That's why you'll find general-purpose Tri-Clad motors in every industry—not only on the usual jobs which they do so economically—but on the *tough* jobs where unfailing performance is a must.

PROMPT DELIVERY

Today especially, delivery and service are important. G-E shipping points all over the country are ready to deliver most standard ratings right out of stock. And with the most complete service shop network in the motor industry you are assured of the best attention to motor problems.

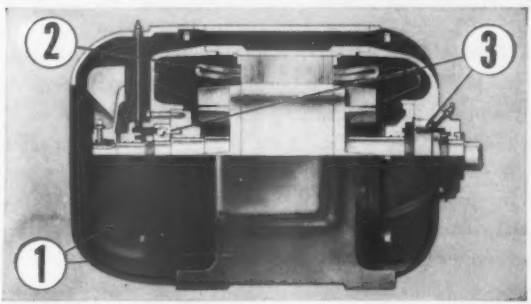
TIMELY INFORMATION AVAILABLE

If you are concerned with training manpower, the new G-E Motor Selection and Application Course, including nine strip films, is a unique and valuable aid. A sample copy of the "Instructor's Manual" (GEZ-310), which outlines the course, may be obtained on request.

Also available is a free bulletin on "How to Maintain Motors and Generators" (GET-1202). Contact your local G-E sales office for any of the above material, or write *Section 752-12, General Electric Co., Schenectady 5, N. Y.*

FOOD PLANTS on "continuous process" operation depend on Tri-Clad motors to avoid costly shut-downs. Totally-enclosed, non-ventilated Tri-Clad gear-motor above drives a repulper in a sugar refinery.

MINING INDUSTRIES know Tri-Clad motors can take abuse, don't twist out of line and are corrosion-resistant. This totally-enclosed, fan-cooled, Tri-Clad motor runs a coal conveyor.



UNINTERRUPTED SERVICE under tough conditions is assured by many outstanding features of Tri-Clad totally-enclosed motors, for example: **1** rigid, cast-iron end shields and frame; **2** Formex* windings which resist oil, heat, shock, moisture, abrasion; **3** *completely* enclosed bearings that will last longer because provision is made for relubrication if necessary.

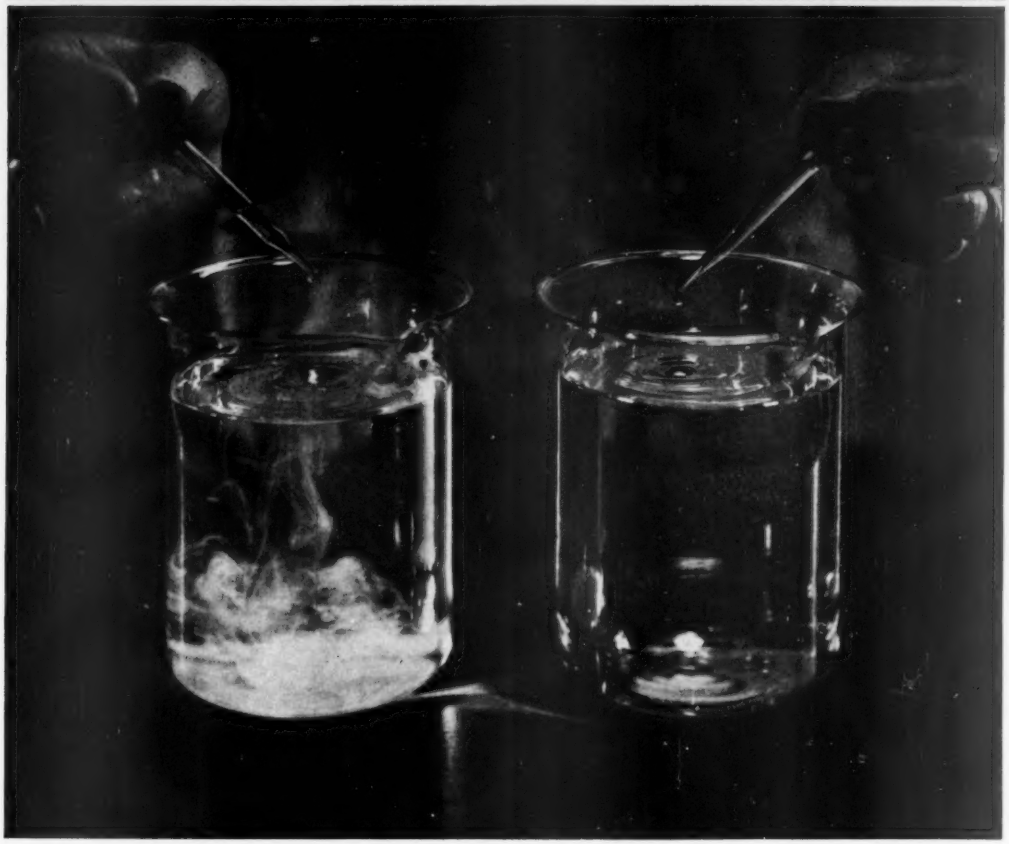
Reg. trademark of General Electric Co.

METAL WORKING FIELD likes Tri-Clad motors because they're easy to mount in any position, rigid and smooth running, and *can be relubricated if operating conditions warrant—without disassembly!* Six 7½-hp TEFC Tri-Clad motors run machine above which polishes 500 to 1000 metal coffee-makers per hour!

"No Plant is Better than its Electrical Equipment"

B-24b

You should expect the best value from G-E fluorescent lamps

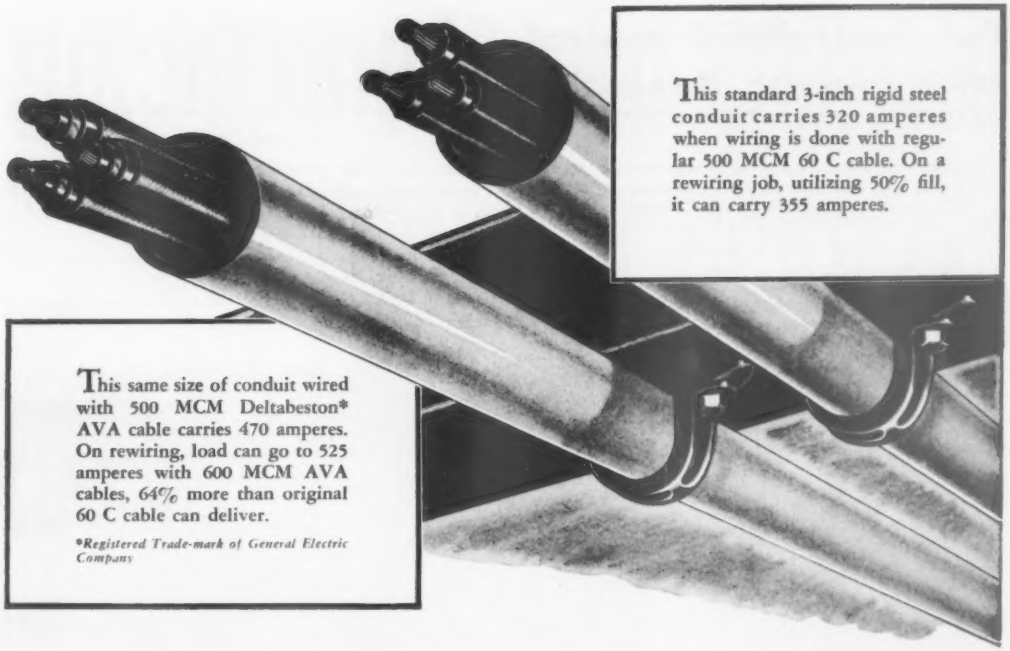


WATER TOO PURE TO DRINK HELPS GIVE YOU MORE LIGHT. It's the water on the *right* you wouldn't want to drink. It's so pure it's tasteless. You'd prefer the water on the left. Ordinary tap water, it's safe enough for drinking. But not for G-E fluorescent lamps. A chemical reagent shows mineral impurities. If they got into the phosphor coating, they would cut light output. On the glass tube, they would create a streaked look. So General Electric uses the specially demineralized water shown at right in making our phosphors and to wash our lamp tubes. It's twice as free of minerals as distilled water. A small precaution—perhaps. But it helps give you more light and better looking lamps. You *should* expect the best value from G-E fluorescent lamps. This is another example of how far we go to make sure you can.

You can put your confidence in

GENERAL ELECTRIC

"Electrical Equipment for Today's Plant"



This standard 3-inch rigid steel conduit carries 320 amperes when wiring is done with regular 500 MCM 60 C cable. On a rewiring job, utilizing 50% fill, it can carry 355 amperes.

This same size of conduit wired with 500 MCM Deltabeston* AVA cable carries 470 amperes. On rewiring, load can go to 525 amperes with 600 MCM AVA cables, 64% more than original 60 C cable can deliver.

*Registered Trade-mark of General Electric Company

Which conduit carries more current?

Whenever you add distribution or change existing wiring systems, investigate the savings of Deltabeston AVA cable. Deltabeston can actually offer more current per pound of copper—can pack as much as 64% more current into your present raceways.

Because it's built to beat the heat with a double asbestos insulation and the famous G-E No. 1799 varnished-cambric—Deltabeston cable can take elevated temperatures in its stride. Thus, it can handle more current than ordinary types *at normal ambient temperatures*. And non-aging asbestos insulation offers the extra advantage of long service life.

Whenever you wire, look into the advantages of Deltabeston AVA cable. For further information contact your local G-E Construction Materials distributor or write Section W5-434 Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Deltabeston
WIRES and CABLES
Built to beat the heat

You can put your confidence in—

GENERAL ELECTRIC

"No Plant is Better than its Electrical Equipment"

B-26

For centralized control with greater flexibility

Announcing

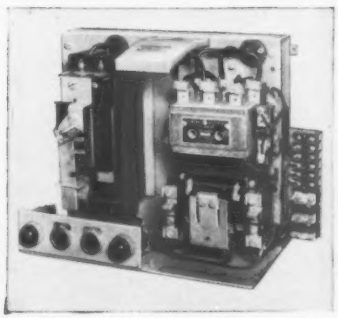
Here's an attractive, versatile new motor control center that you can easily plan, install, and service. Compact—a section is only 20 inches wide, 20 inches deep, and 90 inches high. It will accommodate NEMA Size 1 through 4 starter units back to back.

A four-inch wiring trough provides ample space for outgoing wires and cables. Starter units are designed for easy inspection and servicing.

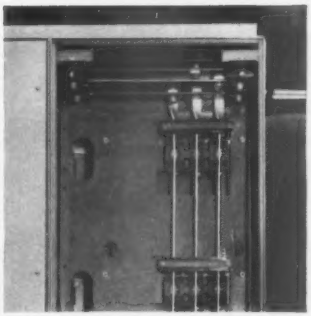
There are many provisions for protecting personnel from mechanical and electrical injury. This G-E motor control center has also been laboratory tested to assure protection against 25,000 amperes short-circuit current. More information on this new, modern motor control center in bulletin GEA-4979A. Write your nearest G-E office today. *General Electric Co., Schenectady, N. Y.*

THIS COMPACT, ATTRACTIVE, G-E MOTOR CONTROL CENTER provides the most modern method of controlling a-c motors up to 200 horsepower from a central location.

the NEW General Electric Motor Control Center



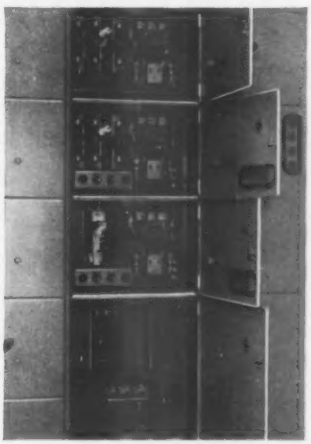
STARTER UNITS ARE COMPLETELY ACCESSIBLE. All components—even the pilot devices—are mounted on a sturdy frame with all terminals front connected.



DESIGNED TO PROTECT PERSONNEL. Rear view shows metal barrier that separates starter unit space from bus bars. Vertical section features new "I-beam" construction for strength.

EASY TO INSTALL AND INSPECT. Sturdy, light-weight starter units are easy to handle, and interchangeable because of standardized dimensions and components.

EASY TO WIRE. Ample four-inch wiring trough is completely accessible by removing horizontal metal barriers between units. Barriers isolate and support units as they are slid into section.



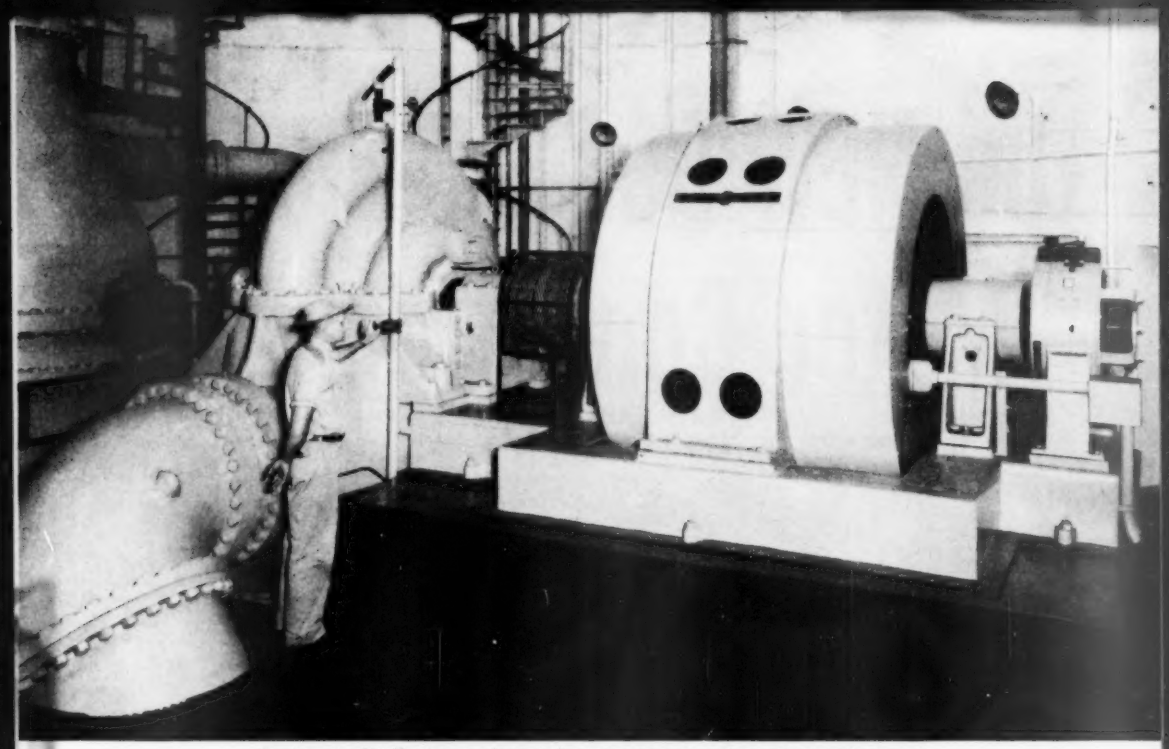
VERSATILE. Starter unit sizes and types are in even multiples of 14 inches. Fusible and circuit breaker combinations of the same starter size are interchangeable without changing doors.

EASY TO SERVICE. Doors swing wide (no hinge wiring); unit is easily disconnected from bus and held in test position for protected servicing.

GENERAL ELECTRIC

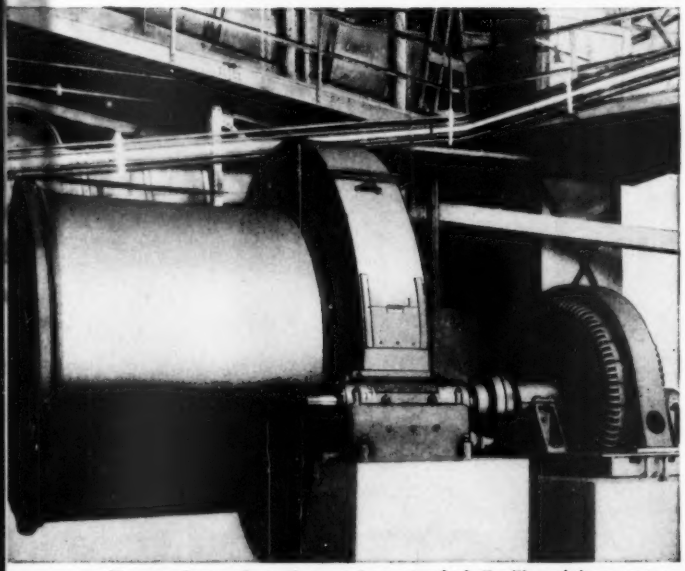
730-31

"No Plant is Better than its Electrical Equipment"

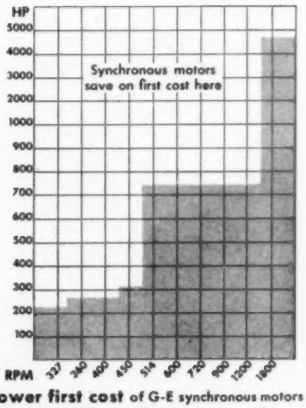


Savings in distribution equipment investment were made possible by selection of this General Electric 2500 hp synchronous motor for a municipal pumping station.

G-E Synchronous Motors

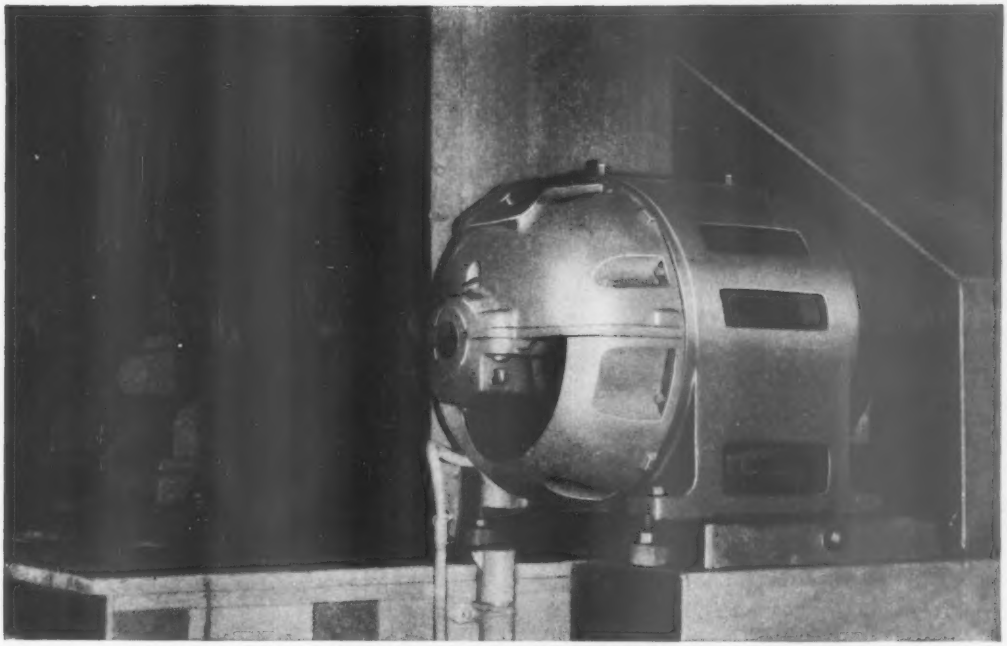


To meet the tough starting requirements of a ball mill, a mining company chose this G-E high-torque synchronous motor rated at 600 hp. Initial cost was low and the motor has given 20 years of dependable service.



Lower first cost of G-E synchronous motors is shown above. For applications in the white area, synchronous motors cost less than any other kind of motor. Calculations below show power savings on a typical 1000 hp, 514 rpm motor.

Gain in efficiency over other types of motors at same rating	**2.2%**
Hourly saving at power rate of $0.01 per/kwh	**$0.184**
Yearly saving (assuming constant operation)	**$1600.00**



Lower operating cost is the rule when General Electric Tri-Clad® synchronous motors are used with equipment such as this horizontal band re-saw, operating almost continuously at heavy loads.

Offer Double Savings

Lower First Costs, Lower Operating Costs Can Be Realized on Large, Constant-Speed Applications in Many Industries

Before you select a drive for a large equipment providing heavy and continuous service, be sure to investigate the economics of General Electric synchronous motors. On many applications such as pumps, compressors, fans, etc., outstanding savings are available.

LOWER FIRST COSTS

In most ratings where horsepower is equal to or greater than speed, the price tag on a synchronous motor with exciter and control is less than that of any other a-c motor with its control.

And, because a synchronous motor improves plant power factor, initial investment in distribution equipment frequently can be reduced. (The load which any new or expanded power system will carry is proportional to the plant's power factor.)

LOWER OPERATING COSTS

A synchronous motor usually has a higher full-load efficiency than any other type of motor, produces more work per dollar's worth of power consumed. Where loads are heavy and continuous, an advantage of from 0.5 to 3.0% in efficiency pays off.

Engineers with many years of field experience will tailor G-E synchronous motors and control to your job. Call in your General Electric representative—he'll be glad to discuss your particular application. And for more information on G-E synchronous motors, write for bulletins GEA-5332 (low-speed) or GEA-5426 (high-speed) to Section 770-26, *General Electric Company, Schenectady 5, N. Y.*

BE SURE TO SPECIFY G-E SYNCHRONOUS MOTORS

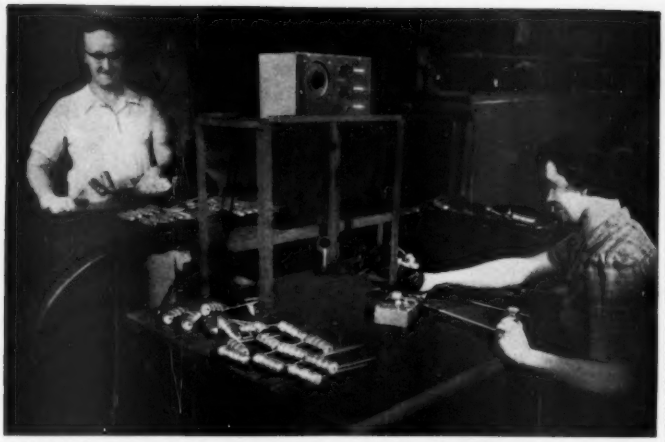
The result of more than 55 years experience in development, manufacture, and successful application, General Electric's line of synchronous motors is available in low speed and high speed types, engine-type and Tri-Clad® construction.

Numerous exclusive design and construction features promote long, dependable service. Get the full details!

®Reg. trademark U.S. Pat. Off.

GENERAL ELECTRIC

770-26



With G-E Continuous Sampling Monitor . . .

100% INSPECTION ELIMINATED; TWO INSPECTORS REPLACE NINE

Seven inspectors were freed for other work when a large refrigerator manufacturer switched from 100% inspection to the continuous sampling method, using the new G-E Continuous Sampling Monitor. This new device automatically keeps a record of accepted and rejected units, and informs inspector when to inspect every unit, and when to sample. Paperwork and tedious calculations are eliminated.

Continuous Sampling Monitor will:

- Cut inspection time, cost
- Eliminate excess paperwork
- Maintain desired AOQL*
- Improve outgoing quality

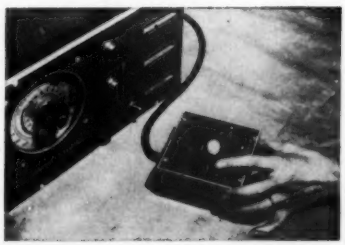
All essential ingredients of a sampling plan are met with the G-E Continuous Sampling Monitor; AOQL* is assured statistically. Increased inspection is provided when product quality is poor, reduced inspection when product quality improves. Signal lights warn foreman when product quality is poor, permitting immediate corrective action.

The G-E Continuous Sampling Monitor opens the field of sampling inspection to many types of production lines where formerly 100% inspection was required.

Investigate this new approach to quality control. Write for descriptive bulletin GEA-5738 to: General Electric Co., Sect. 687–88, Schenectady 5, N. Y.

*Average Outgoing Quality Level

Quality Control Specialists prove to operating management that G-E Continuous Sampling Monitor maintains desired AOQL*.



G-E Continuous Sampling Monitor (left) with control station. Note small space requirement for the two units.

GENERAL ELECTRIC

687-88

Basic industrial electronics . . .

made plain for those who INSTALL, USE, and MAINTAIN control devices

Now you can understand the many electronic devices being used so widely in power and industrial plants—and do practical work with them. This book gives you in ABC fashion the fundamentals of electronics. It also shows you the complete breakdown of each kind of device —the tubes and circuits used, and how it functions—just the material you need to hook up controls for particular jobs, see that they operate right, and keep them in good shape.

Just Published!

PRACTICAL INDUSTRIAL ELECTRONICS

By F. A. ANNETT
Associate Editor, **Power**
391 pages, 369 illus., $5.50

IN down-to-earth language this practical book describes such devices as electronic heating system controls, automatic electronic combustion control, magnetic drive-sped control. It shows you how motor generator exciters work —explains the function of liquid level and pump controls. It clearly discusses the application, circuits, and operation of rectifiers, relays, oscillators, smoke indicators, and recorders, combustion safeguards, motor-speed controllers, etc.

Electrical fundamentals and elementary circuits are covered in separate chapters. With these, and the plainly-explanatory treatment throughout, the book makes electronics a simple, useful thing instead of a mystery.

This volume grew from a series of widely-acclaimed articles first published in **Power**. As presented here, the treatment grounds you in needed fundamentals — provides aid in working with electronic devices being more and more encountered in industry.

10-DAY FREE TRIAL

Contents:

1. The Electron
2. Electron Tubes
3. Photoelectric Tubes
4. Reactors and Capacitors
5. Electron-tube Rectifiers
6. Mercury-arc Rectifiers
7. Disc-type Rectifiers
8. Instantaneous Electronic Relays
9. Time-delay Electronic Relays
10. One-, Two- and Three-Stage Amplifiers
11. Voltage-regulating Devices
12. Electronic Oscillators
13. Photoelectric Devices
14. Smoke Indicators and Recorders
15. Combustion Safeguards
16. Automatic Combustion Control
17. Magnetic-drive Control
18. Motor and Generator Exciters
19. D-c Motor Control
20. Speed Control of A-c Motors
21. Liquid-level and Pump Controls
22. Heating-system Electronic Control

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Send me Annett's **PRACTICAL INDUSTRIAL ELECTRONICS** for 10 days' examination on approval. In 10 days I will remit $5.50 plus few cents delivery, or return book postpaid. (We pay delivery if you remit with this coupon—same return privilege.)

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This offer applies to U. S. only

"Electrical Equipment for Today's Plant"

Make Naked 8 Bar Conductors SAFE

with insul 8 bar T.M.

the new *insulated* trolley system

- Low cost
- Quick, easy installation
- For either existing or new systems

This revolutionary safety system is easily and inexpensively applied to either existing systems (without dismantling) or as a complete new system. Naked figure-8-bars in your plant can be fully insulated quickly—for maximum safety.

The sliding shoe collector is held against the

insulated 8 bar by spring action, adjustable from 2 to 10 pounds.

NOTE: the *Insul-8-Bar* system (pat. pend.) is adapted to short radius curves, all types of switches and crossovers.

- Distributors coast-to-coast
- Write for detailed description of the Insul-8-Bar system, and name of your nearest distributor.

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1285 ROLLINS ROAD • BURLINGAME, CALIF.

BENBOW
INSULATED TROLLEY
busways

Do It Electrically

Electric power, produced wholesale in a central station, is the lowest-cost power you can buy. EDISON Nickel-Iron-Alkaline Storage Batteries make it available to material-handling trucks with these important additional advantages: high-torque electric-motor drives . . . power instantly on and off for maximum efficiency in the inherently stop-and-go operation of material-handling trucks . . . quiet operation . . . no inflammable fuel . . . no odors or exhaust fumes . . . maximum availability.

EDISON Nickel-Iron-Alkaline Storage Batteries employ steel cell construction, an electrolyte which is a recognized preservative of steel and a foolproof electrochemical principle of operation. They are unequaled for durability, dependability, long life and operating economy. In combination with electric-motor drives, they insure the closest approach to failure-free truck operation known. They are available in steel cradles and demountable steel boxes for ease in exchanging at convenient intervals for multiple-shift truck operation.

Because EDISON batteries are so widely known for high quality, many people think they are higher priced than they really are. Get prices on the capacities required by your trucks. By comparing this factor with their well-known long life, you will see why they are first choice of cost-conscious users. Send for free copy of our bulletin *Modern Material Handling;* describes the unit-load method of handling, the power requirements of material-handling trucks, and the characteristics of EDISON batteries; 28 pages; 8½x11; profusely illustrated. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

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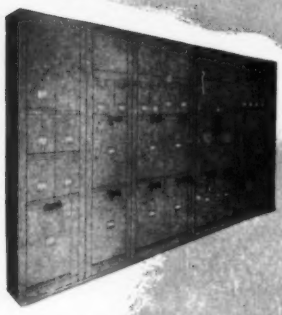
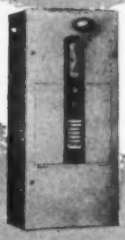
STORAGE BATTERIES

SAFE, DEPENDABLE
Power *and* Light Control



KLAMPSWITCHFUZ
SWITCHBOARD

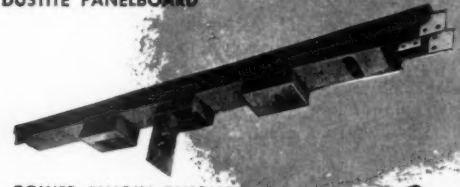


SHUTLBRAK SWITCH

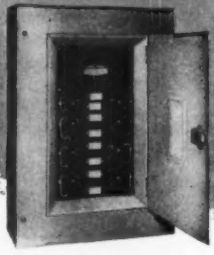
LNTP PANELBOARD

FA

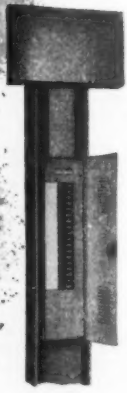
DUSTITE PANELBOARD



POWER PLUGIN BUSDUCT



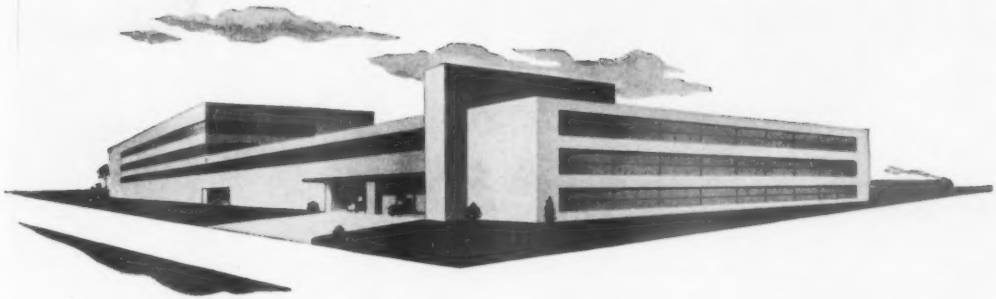
PULFUZSWITCH
POWER PANELBOARD



THERMAG COLUMN
TYPE PANELBOARD

MIDGET POWER PLUGIN BUSDUCT

For the Factory of Today and Tomorrow!



That's what FA offers—safe, dependable and efficient electrical products for the distribution and control of light and power.

For years, FA has specialized in the manufacture of switchboards, panelboards, busduct and other similar equipment for industrial, commercial and institutional use—products that are modern in design, rugged in construction, easy to install, provide long-lasting, trouble-free service and require less maintenance.

If you are contemplating a new plant, or if you are planning to expand, modernize or otherwise improve an existing plant—regardless of size—have your architect or engineer contact your nearest FA representative (listed in Sweets) for helpful information . . . or write for bulletins.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 13, MISSOURI

FA TRADE MARK

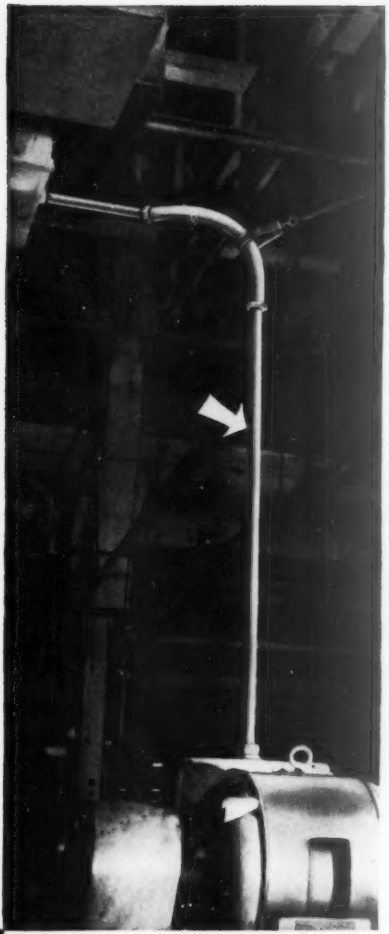
"No Plant is Better than its Electrical Equipment"

POWERDUCT

"Powerduct Cable means a big saving for us," says Frederick Lynn, chief electrician at The High Standard Mfg. Corp., Hamden, Conn., makers of Hi-Standard firearms, internationally famous for their accuracy and painstaking craftsmanship.

"You'd be surprised that a very big item is being able to use Powerduct over and over again as production increases and model changes are made. Twelve feet, fifteen feet, it doesn't make any difference. I'm able to use it any place. Powerduct is never wasted. That's why it's less expensive.

"Because busduct with Powerduct means complete flexibility, we increase the use and mobility of the machine. Our crew saves many man-hours by being able to plug in Powerduct instead of wiring a whole rigid conduit system."



"For heavy equipment we plug the cutout in the busway and run the Powerduct almost directly to the machine. It's not likely this machine will be moved, so the usual loop is not necessary."

"Here's the installation for lighter equipment. By varying the size of the loop I can move the machine."

Powerduct complies with Section 3646 to the 1951 National Electrical Code.

Powerduct has full Underwriters' approval, costs less than any other approved type of cable. For further details on Powerduct, contact your nearest Anaconda Distributor or Anaconda Sales Office—or write to Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

52376

the right cable for the job ANACONDA wire and cable

"Electrical Equipment for Today's Plant"

Positive Safety

FOR PLANT AND PERSONNEL

APPLETON REELITE

TRADE MARK

Automatically Takes Up, Pays Out Conductor Cable
Keeps Cord Reeled Up Safely Out of the Way

TYPE "YS" FOR TRAVELING HOISTS

The Appleton Type "YS" Reelite for traveling hoists is built with a swivel base, permitting cord to be fed in any direction. Mounted at the mid-point, a Type "YS" Reelite equipped with 45 feet of cord will serve a stretch of track 90 feet long, straight or curved.

The Type "YS" Reelite eliminates the necessity for exposed current collectors, trolleys or wires. Outer cover easily removed to service brushes and power spring, or to make solderless line connections direct to terminal block. Oil-less bearings at all points of rotation.

RATING: 15 Amperes, 550 Volts A.C.; 250 Volts D.C.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

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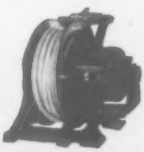
Field Engineers in all Principal Markets

SEND TODAY for free copy of new Bulletin 504. Fifty full pages describing Appleton Reelites shown here, plus special types and combinations for power tools, air and liquid lines. Or see Sweet's File. Page 2a/Ap.

NOW... A GREAT NEW APPLETON REELITE

Here's the new, *all new,* Appleton 7S Portable Reelite—an automatic cord reel that takes light right where it's needed, in car-loading, stock-keeping, machine inspection, building maintenance—on hundreds of jobs that require bright, safe, movable illumination. Now equipped to swivel continuously in either direction. Keeps cord reeled up out of the way. Positive stop action holds cord at desired length—re-reels cord when job is done. Available accessories include six types of hand lamps, machine tool connector body or key socket.

CONSTANT DUTY TYPE FOR HEAVY JOBS



Carries smooth, uninterrupted power to moving electrical machines. Automatically winds up and pays out rubber covered cable to cranes, hoists, elevators, lifting magnets, generator sets—heavy mobile equipment of every kind. Pays for itself in efficiency, safety, cable protection.

APPLETON ELECTRIC PRODUCTS

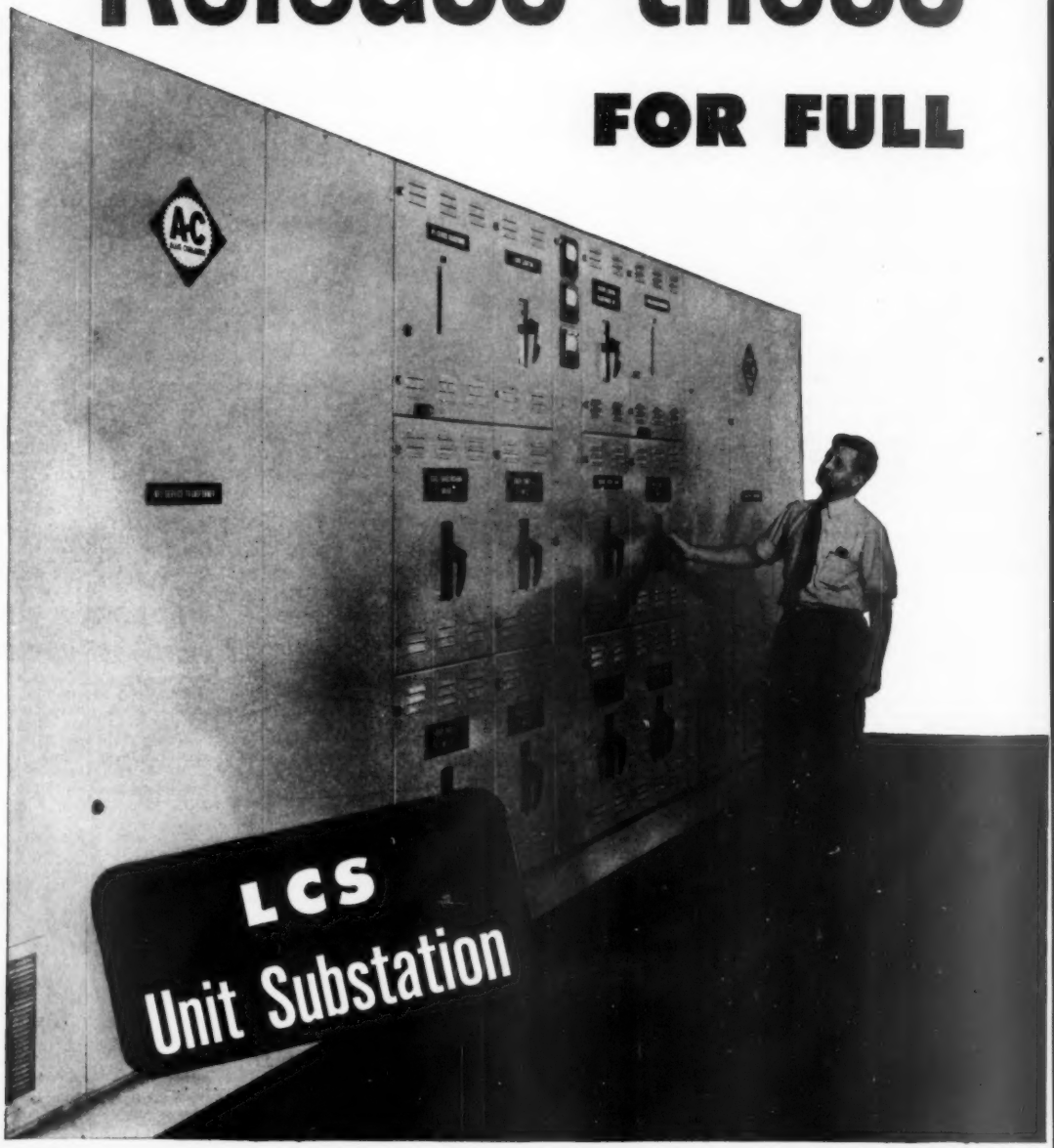
CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

"No Plant is Better than its Electrical Equipment"

ALLIS-CHALMERS

Release these

FOR FULL



"Electrical Equipment for Today's Plant"

UNIT SUBSTATIONS

Men

PRODUCTION

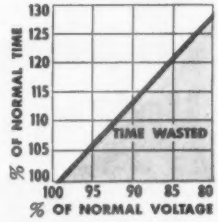
HOW MANY WORKERS in your plant are tied to low producing machines . . . turning out less work than they should because undervoltage cuts machine output? And how many more are slowed down on benchwork, layout and inspection because undervoltage pulls illumination below adequate levels? Even properly designed distribution systems may no longer be sufficient because of new machinery that has been added and production schedules that have been stepped up.

When your plant operates at 10% undervoltage, torque available from squirrel-cage motors driving production machines is 19% below normal . . . infra-red bulbs take nearly 20% longer to deliver rated amounts of heat . . . workers take up to 25% longer to do their jobs and accident rates are high because illumination levels drop as much as 30%.

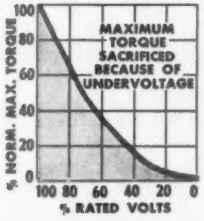
Recruit manpower from within your own plant by getting rid of low illumination levels that rob worker efficiency. Recover production time wasted by slow producing machines. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletins 11B6285A, 11B6325B, and 11B6895. A-3373

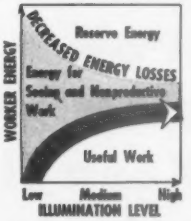
HOW UNDERVOLTAGE WASTES MAN-HOURS . . . CUTS PRODUCTION



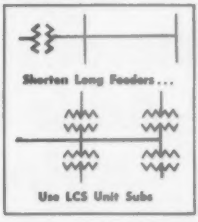
TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, for instance, drying time for black-painted sheet steel was increased from 11 minutes to 18 minutes by a 10% reduction in voltage.



JOBS TAKE LONGER because torque and horsepower drop when voltage drops. Less torque means lighter cuts on lathes, shapers, drill presses, and other machine tools. Motors overheat on undervoltage, burn out faster. More time must be spent on each job. More overhead . . . more man-hours have to be figured into every job.



WORKERS SEE BETTER, produce more when full voltage is maintained. Illumination was increased from 6 to 16 ft. candles (equal to an increase from 83% to full voltage) . . . resulting in a 9% increase in production, 20% decrease in accidents. In another case, production increased 25% with improved illumination.

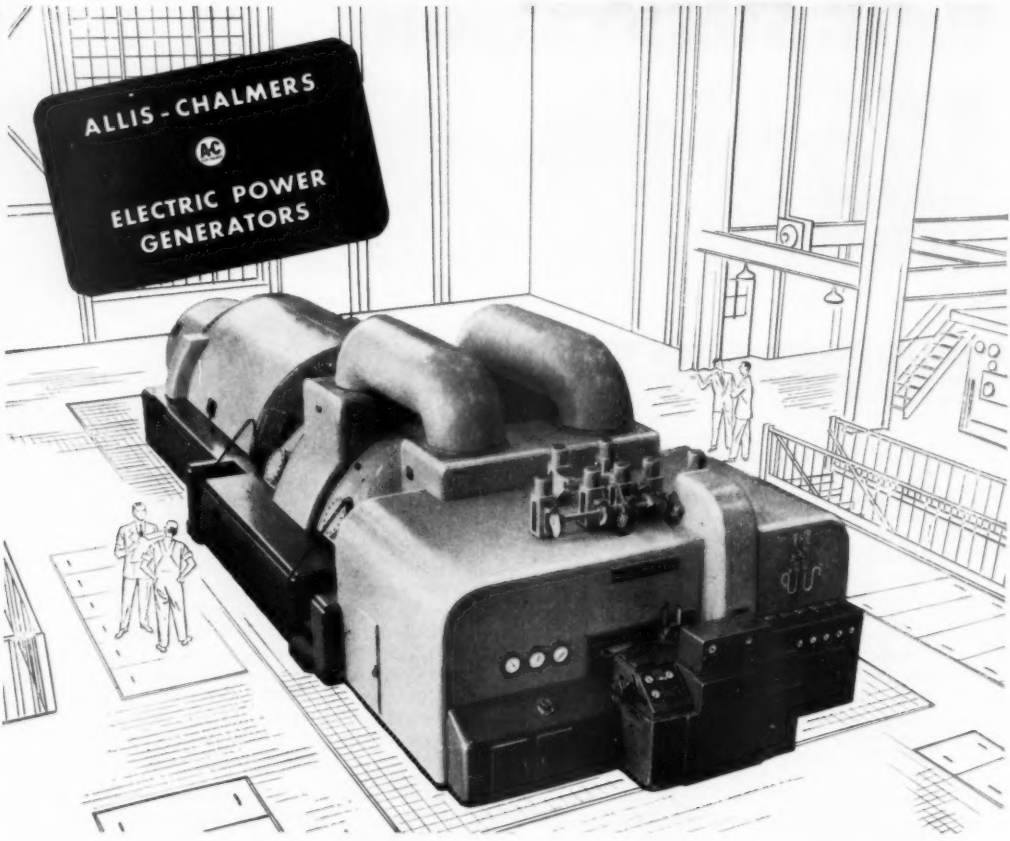


A MAJOR CAUSE of undervoltage is the voltage drop in secondary feeders. Long lines of heavy copper carrying power at low voltage may prove inadequate as production schedules are stepped-up and new machines added. Install Allis-Chalmers LCS Substations at load centers to reduce voltage drop and increase production.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

"No Plant is Better than its Electrical Equipment"



Wisconsin Power and Light Company Adds New High-Efficiency Unit – Helps Keep Electric Rates Low

THIS Allis-Chalmers steam turbine-generator was put into service recently in Wisconsin's Edgewater plant at Sheboygan, Wis. and makes electricity for surrounding towns, factories and farms.

The generator is another Allis-Chalmers "first." It is the *first ever built* that employs a much improved application of "supercharged" hydrogen cooling.

This new development allows the generator to be smaller in size than is normal for 60,000 KW capacity and tends to reduce maintenance problems—all of which helps to keep electricity rates low.

This machine works alongside of two earlier-model Allis-Chalmers turbine-generators at this same station and delivers the same amount of electricity as the two put together—thus increasing electricity production for this area by 100%.

Allis-Chalmers
Makes Machinery to Help
People Produce More—
Have More—
Enjoy More Leisure Time—
LIVE BETTER!

ALLIS-CHALMERS

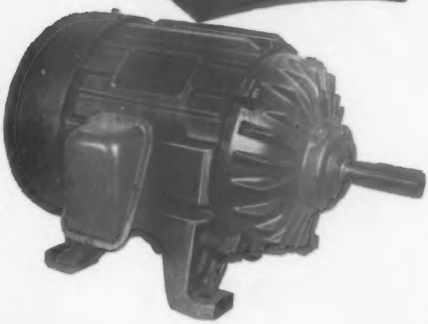
GENERAL MACHINERY DIVISION

MILWAUKEE, WIS.—PITTSBURGH, PA.—NORWOOD, OHIO—BOSTON, MASS.—TERRE HAUTE, IND.—MONTREAL, P. Q.—ST. THOMAS, ONT.

"Electrical Equipment for Today's Plant"

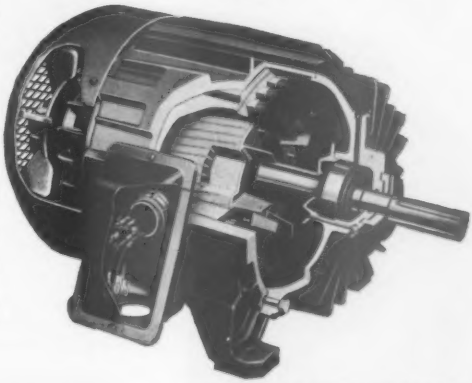
Totally-Enclosed Fan-Cooled

Look Outside



Greatly increased radiating area means greater cooling efficiency. More important, cooling efficiency stays high, regardless of operating conditions. There are no enclosed external air passages to clog and cause overheating. If oily dirt sticks, just wipe or blow it off. No matter how bad operating conditions are, this motor can be easily kept clean and cool running. Electrical parts are protected against corrosive atmospheres by cast iron yokes and end housings.

Look Inside



Double-shielded, heavy-duty ball bearings require no maintenance in ordinary service under most conditions. However, they can be lubricated without disassembly if required. Double shielding prevents over-lubrication, leading cause of bearing trouble. Rotating seals, where shaft extends through housings, keep dirt and moisture out of bearing chambers. Die cast rotor and interphase insulation are further assurance of long life and low maintenance.

See WHY THIS IS YOUR BEST MOTOR BUY

HERE IS A MOTOR that is different from conventional TEFC motors; built with an entirely different cooling system that gives you big savings in lower maintenance, more continuous service and less trouble in the toughest locations. Clogging can easily be prevented in the Allis-Chalmers Type APZ TEFC motor since areas that might collect dirt are exposed and easy to clean.

GET DETAILS NOW — *Ask your nearby Allis-Chalmers Authorized Distributor or District Office for more complete information on this high performance TEFC motor. Or write direct to Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.* A-3578

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

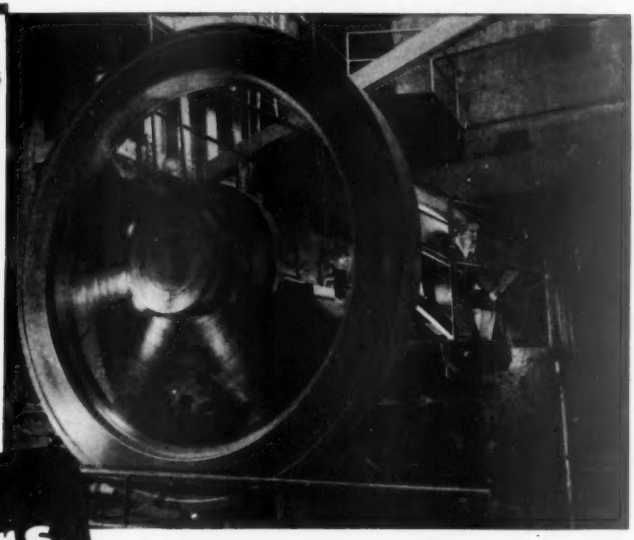
PUMPS — Integral motor and coupled types from ¾ in. to 12 in. discharge and up.

ALLIS-CHALMERS

"No Plant is Better than its Electrical Equipment"

B-38

CONTROL *Engineered* to help produce copper

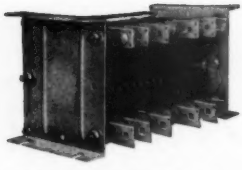


Starters

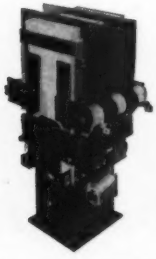
IT TAKES CONTROLLED POWER to process copper ore. Crushing run-of-the-mine ore in this giant jaw crusher, for example, takes a 300-horsepower wound-rotor motor and an Allis-Chalmers Type H Starter engineered especially for extremely high starting inertia and variable loads.

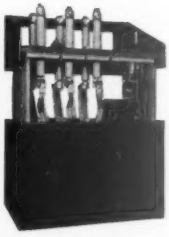
A-3670

THIS STARTER controls the motor to provide smooth acceleration in overcoming the inertia of heavy crusher jaws and large fly wheels. This is accomplished by means of a full automatic starter having six secondary accelerating steps.



EXTRA HEAVY DUTY resistors in the motor secondary circuit provide starting torque and smooth acceleration. Adjustable time delay relays control closing of the accelerating contactors to cut out successive resistor banks . . . automatically bringing the crusher to speed.





SELECTION OF PRIMARY CONTACTORS for every Allis-Chalmers controller is based strictly on job requirements. Allis-Chalmers high voltage starters have either oil-immersed or air-break contactors as standard.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

There are Allis-Chalmers controllers for use in every industry...starters for squirrel-cage, wound-rotor and synchronous motors. For starters up to 2500 hp at 5000 volts — check with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 14B6410A.

"Electrical Equipment for Today's Plant"

NOW ON HAND
Integral Horsepower Electric Motors—conforming strictly to NEMA SPECIFICATIONS
FULLY GUARANTEED

AVAILABLE IN THE FOLLOWING TYPES:

- ★ **Open Drip Proof Motors**
- ★ **Totally Enclosed Fan Cooled Motors**
- ★ **Pump Motors:**
  - Style "C" Face Mounted
  - Style "P" Vertical Solid Shaft
  - Vertical Hollow Shaft
- ★ **Adjustable Speed Schrage Motors**

MOTORS EXCEEDING 200 HP. BUILT TO ORDER

Today, world-famous ACEC electric motors are not only *immediately available* to American customers from warehouses in the United States, but ACEC SERVICE is available from Maine to California, from Washington to Florida.

232 DISTRIBUTORS AND MOTOR SERVICE SHOPS, throughout the nation, are fulfilling the service requirements of ACEC customers promptly and efficiently. *Every* user of ACEC products has the assurance that he can call upon skilled, dependable workmanship to maintain his equipment in perfect running order.

As a designer and manufacturer of electric motors, ACEC has established a world-wide reputation for excellence, and it is the set policy of the management that in matters of performance, promptitude, and courtesy the ACEC SERVICE DIVISION shall continue *unsurpassed*.

Whatever your electric motor requirements, write, wire, or telephone the nearest ACEC office or representative—or communicate directly with us in New York. Inquiries and orders receive immediate attention.

IMMEDIATE DELIVERY from NEW YORK • CHICAGO • KANSAS CITY • NEW ORLEANS • DALLAS and LOS ANGELES Warehouses

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BELGIAN ELECTRIC SALES CORPORATION

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"STARTING LOAD ON OUR 40 H. P. CRUSHER MOTOR CAUSED 400 AMP. ORDINARY FUSES TO BLOW . . . BUT NOW 125 AMP. FUSETRON FUSES LET MOTOR START AND GIVE BURNOUT PROTECTION TOO."

Mr. Meeka explains . . .

"We have a crusher driven by a 40 h.p. 250 volt motor. The starting load on this motor is often quite heavy and gave us no end of trouble by causing the 400 ampere fuses protecting the circuit to blow.

"Some months ago, after checking the actual running current of the motor with an ammeter, we decided to see if FUSETRON dual-element Fuses could live up to their claims.

"The ammeter reading indicated that 125 ampere FUSETRON Fuses should be used to give motor-running protection. So, we installed this size.

"Were we surprised—they not only hold the starting current of the crusher motor—but we have the satisfaction of knowing the motor also has burnout protection to back up the overload relays in case they should ever fail.

"Not once since we installed FUSETRON Fuses have we lost a moment's production due to a fuse blowing needlessly."

ED MEEKA
Supt., ROBINSON BRICK & TILE CO.
Denver, Colorado

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

(FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.)

"Electrical Equipment for Today's Plant"

"FUSETRON FUSES NOT ONLY ELIMINATE USELESS SHUTDOWNS - THEY GIVE YOU 10 POINT PROTECTION."

1. Protect against short-circuits.*
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating—lesser resistance results in much cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels
10. Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

DON'T RISK LOSSES

One **needless** shutdown . . .
One **lost** motor . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

MAIL THE COUPON NOW for complete information about the All-Purpose Protection of FUSETRON Dual-Element FUSES.

BUSSMANN Mfg. Co. (Division of McGraw Electric Co.)
University at Jefferson, St. Louis 7, Mo.

Please send me complete facts about FUSETRON dual-element Fuses.

*Name*_____

*Title*_____

*Company*_____

*Address*_____

*City & Zone*_____ *State*_____ 552

"No Plant is Better than its Electrical Equipment"

START

using CLARK Bulletin 6018 and 6020 Type "CY" Combination Starters which combine a Safety Switch or Circuit Breaker and Motor Starter in one cabinet.

STOP

the extra cost of installing and wiring separate Safety Switches or Circuit Breakers with Motor Starters.

START

saving time and insuring production by using CLARK Type "CY" starters for your AC motors.

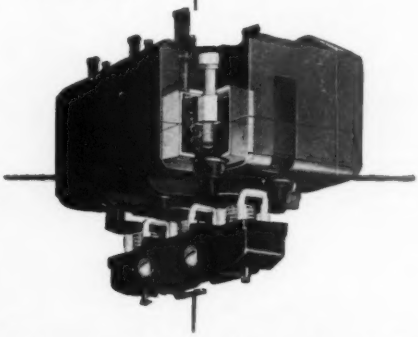
STOP

high cost caused by time out for maintenance and repair.

CLARK Bulletin 6020 Size 2 Type "CY" Magnetic Combination Motor Starter with Circuit Breaker.

All New Design

Clark Type "CY" Starters Sizes 2 and 3 are equipped with strong multi-turn magnetic blow-out coils and twin-break contacts. Contacts are of a special silver alloy selected for its high melting point, non-welding and arc-quenching properties. Contacts require no cleaning.



CLARK Bulletin 6018 Size 2 Type "CY" Magnetic Combination Starter with Safety Switch.

CLARK

Type "CY" starters are engineered and built for rugged service — for more time "on the job" and less "time out for repairs and maintenance."

Available in all types of enclosures to meet every industrial requirement.

New Arc Quenching Principle

The arc in Type "CY" starters Sizes 2 and 3 is extinguished by the effect of the blow-out coils, *concentric with the contacts*. The steel arc chamber and center stud form the magnetic field which rotates the arc — either lengthening or confining it. Since the arc moves continuously on the contact surfaces, burning and pitting is minimized and contact life greatly increased.

Let us show you how CLARK "CY" STARTERS assure more continuous production and lower maintenance.

ENGINEERED ELECTRICAL CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152ND STREET, CLEVELAND 10, OHIO

"Electrical Equipment for Today's Plant"

Century

Serves the Electric Motor User in Two Important Ways:

1. Century motors are designed and constructed for a long, dependable operating life.

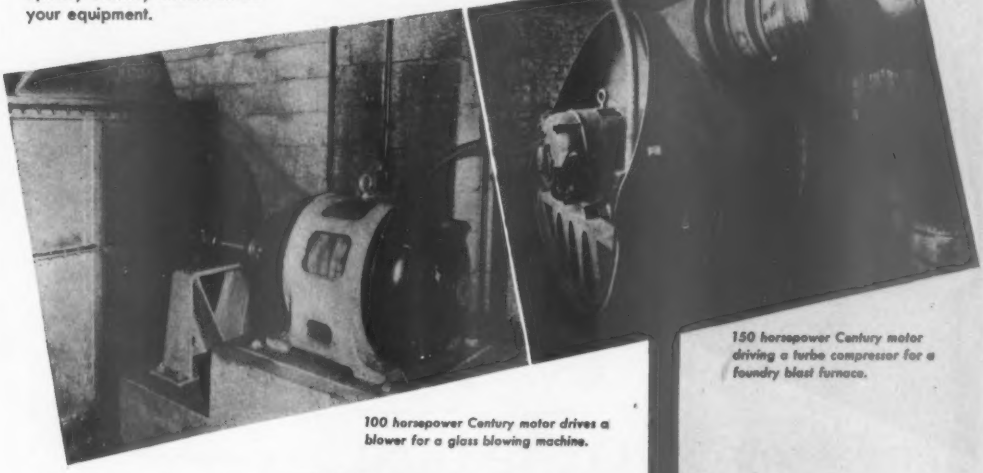
2. Just as important—they are skillfully selected to match the operating characteristics of the many kinds of equipment they drive.

IN CENTURY'S wide range of types and sizes (up to 400 H.P.) there are available: 4 standard classes of starting torque characteristics—6 methods of speed control—constant and short time ratings—4 basic classes of frame protection against atmospheric hazards—a dozen methods of mounting the motor to the equipment—plus many special specifications to meet the requirements of the BIG NAME equipment manufacturers who use Century motors as a component part of their equipment.

Teamwork with equipment producers gives you skillfully selected motors from Century's wide range of types and sizes... properly applied to match the performance characteristics of the machines they drive.

Both a properly designed and constructed motor, plus skillful application, are required to give you top performance and long life on the new ultra-modern production equipment.

Specify Century motors on all your equipment.



100 horsepower Century motor drives a blower for a glass blowing machine.

150 horsepower Century motor driving a turbo compresser for a foundry blast furnace.

Century SERVICE Is Near Any CENTURY Motor Driven Equipment

Century Service Is Near Any Century Motor Driven Equipment. Prompt Service is offered by CENTURY'S National Network of more than 200 Authorized Service Stations, supervised by 28 Century Sales offices.

1. Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.
2. CENTURY Authorized Service Stations are qualified and equipped to service and repair any piece of CENTURY apparatus.
3. Genuine CENTURY renewal parts are available at CENTURY Service Stations, CENTURY Parts Distributors and at the factory in St. Louis.

704

CENTURY ELECTRIC CO.

1806 Pine St. • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Century C MOTORS

"No Plant is Better than its Electrical Equipment"

unit substations

switchgear
(drawout or stationary)

panelboards

feeder & plug-in bus duct

"Concentrol" motor control centers

instrument panels

"Weather-Loc" enclosures

theater switchboards

wireway

• • • the modern, safe, centralized motor control with "Concentrol" positive-pressure plug-in to bus. Furnished with your choice of control equipment. Save space, cut maintenance, keep production rolling . . . at lower installed cost. Make future layout and operation changes easy. And, Continental deliveries are good!

Send for new descriptive "Concentrol" Bulletin No. 400

Before you decide on any Electrical Distribution Equipment, be sure you have Continental's engineered proposals and delivery schedules! Your inquiries will be given prompt attention . . . and Continental's standardized equipment will get you into action . . . fast!

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ELECTRIC EQUIPMENT CO.
BOX 1055-F, CINCINNATI 1, OHIO

. . . manufacturers of one of the most complete lines of Electrical Distribution Equipment

Specify Continental . . . with Confidence!

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. . . . .

Look for "PLANT ENGINEERING PROBLEMS"

You'll find plenty of quick tips to new and better ways to solve plant engineering problems.

It's another

FACTORY

feature

"Electrical Equipment for Today's Plant"

The 1951 INDEX to FACTORY

is now ready

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. . . a complete guide to FACTORY'S editorial contents for 1951. Write the editor today for your free copy.

switchgear
(drawout or stationary)

"Concentrol" motor control centers

panelboards

feeder & plug-in bus duct

unit substations

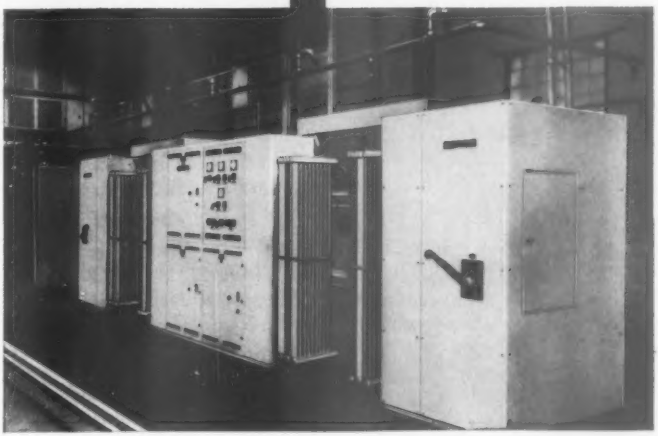
instrument panels

"Weather-Loc" enclosures

theater switchboards

wireway

• • • the modern, low-cost "packaged" method of supplying power. This Continental installation is a 3000 KVA Double Ended Unit. With Continental equipment, you can coordinate your complete electrical distribution system. And, Continental craftsmanship gives you top performance and appearance value.



DATA ON INSTALLATION PICTURED
High voltage sections: Load Break Air Interrupter Switches.
Transformers: Askarel Immersed, 1500 KVA, 3-Phase, 12,000-480 V.
Switchgear: 600 V., Drawout Type Air Circuit Breakers.
Bus Duct: Continental Low Impedance Feeder Bus Duct.

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. . . manufacturers of one of the most complete lines of Electrical Distribution Equipment

Send for literature and standards

Specify Continental . . . with Confidence!

"No Plant is Better than its Electrical Equipment"

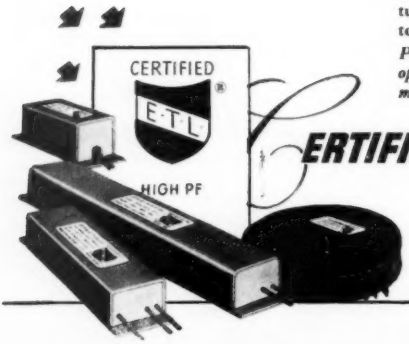
To get efficient fluorescent lighting ... insist on This Shield on your ballast

There's more to satisfactory fluorescent lighting than lamps and a reflector. There's always a ballast in the fixture . . . and the way it performs determines whether you'll get *full lamp life, rated light output* and *satisfactory performance.*

Only CERTIFIED BALLASTS carry the shield that assures best lighting. That's because CERTIFIED BALLASTS are made to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

There's no excuse for inefficient, unsatisfactory fluorescent lighting when CERTIFIED BALLASTS are available.

Be sure every fixture you get has CERTIFIED BALLASTS . . . the ones with the shield.



● Complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer may be obtained from Electrical Testing Laboratories, Inc., East End Ave. at 79th St., New York, N. Y.

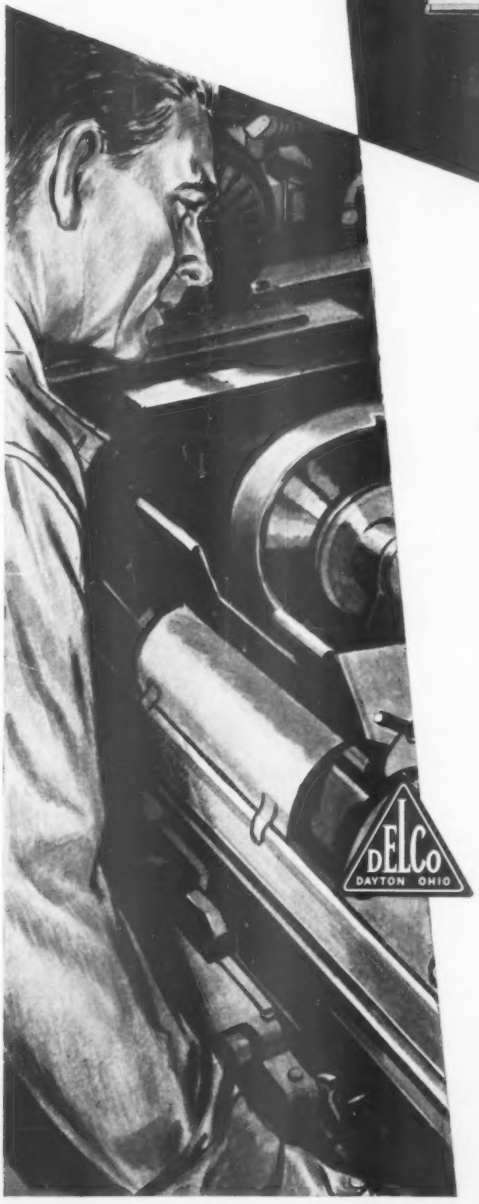
Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.

CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

To Reduce Down Time...



replace with

DELCO MOTORS

The next time a machine is down and the investigation shows that the motor is really "done for" reach for the telephone and get a new Delco on the job.

Delco integrals are now winning their spurs in replacement service . . . they have long been a favorite in the original equipment field.

THERE'S A DELCO FOR PRACTICALLY ANY INDUSTRIAL APPLICATION

Open and closed motors up to 100 h.p. for standard foot mountings. NEMA C&D flange-mounted motors up to 30 h.p. Available through local Delco motors distributors.

DELCO PRODUCTS

Division of General Motors Corporation
Dayton, Ohio

Available Through Local Delco Motors Distributors

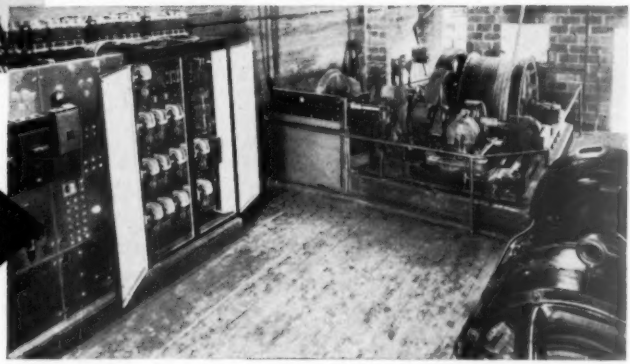
"No Plant is Better than its Electrical Equipment"

At the World's Largest Slag Plant—owned and operated by Birmingham Slag Company, Birmingham, Alabama.

AUTOMATIC CONTROL

Does What Human Hands Couldn't Do

Production schedule, averaging one trip per minute, now easily maintained.



New EC&M FREQUENCY RELAY Controller slows bucket by plugging to prevent overtravel and derailment of cars. Power occasionally re-applied as trip ends.

Previously, manual jogging by skilled operator could not always avert delays, even though downcar was aided by engaging counterweights to offset overhauling effect of car going over the knuckle at the top.

THE PROBLEM:

How to govern speed *from the ground level* as the loaded bucket reaches the top, levels out and quickly tips to dump. The motor load, a maximum driving value on the upgrade, falls off as the bucket levels out, and changes quickly to maximum *overhauling* as the bucket jackknifes to dump. An operator has little time to "feel" or judge the motor load under such swift or sudden changes.

THE SOLUTION:

EC&M Frequency Relays respond accurately to the slip-frequency of the wound-rotor hoist motor. As a loaded bucket reaches the top, plugging is automatically applied by the limit switch and the bucket reaches the end of travel with motor speed reduced to 17% or less. An empty bucket going over the knuckle operates in like manner. With a *heavily loaded* bucket, power may be re-applied after plugging but the motor seldom speeds up to a point where a second "plug" is required before the trip is ended. EC&M Frequency Relays provide a simple, accurate method of controlling plugging and accelerating contactors for smooth operation of the a-c skip hoist.

Write for your copy of EC&M Frequency Relay Controller Bulletin 9305-SK.

Contacts Lasted 3 Months—
No Replacement Now in Over 2 Years

Previously, frequent jogging handling heavy currents accelerated contact wear. Since converting to automatic operation by Frequency Relays, movements are a minimum and examination after 2 years indicates no replacement will be needed for some time.

THE ELECTRIC CONTROLLER & MFG. CO.
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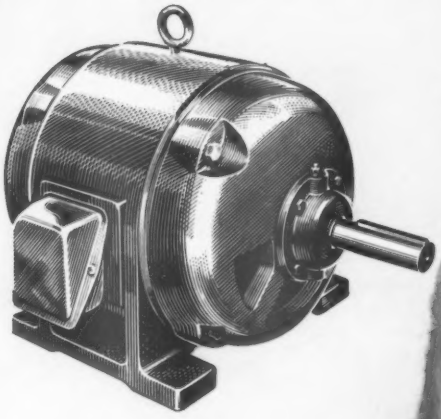

For over 70 years extra strength and stamina have been bred into Electro Dynamic motors to fulfill the most exacting demands of industry.

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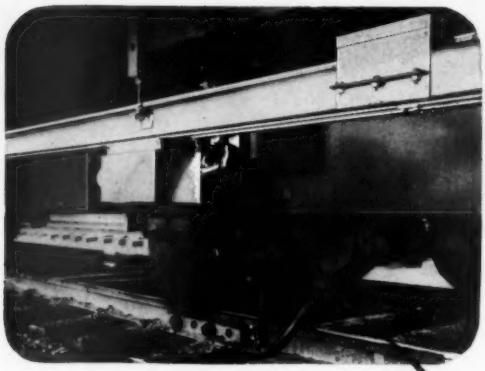
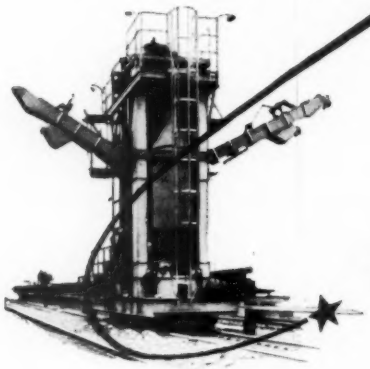
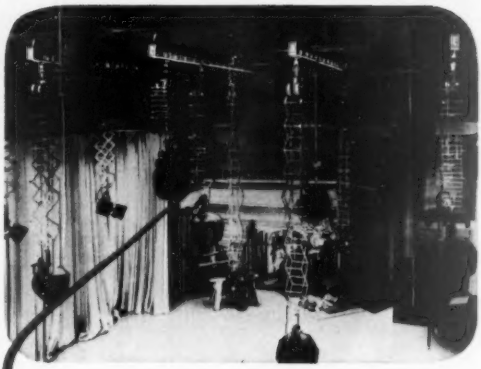


Above, track and trolley supplying current to one of two icing machines, shown below, developed by Railways Ice Co., and built by Link Belt Co., for Denver & Rio Grande Western R.R.



To

TELECASTING



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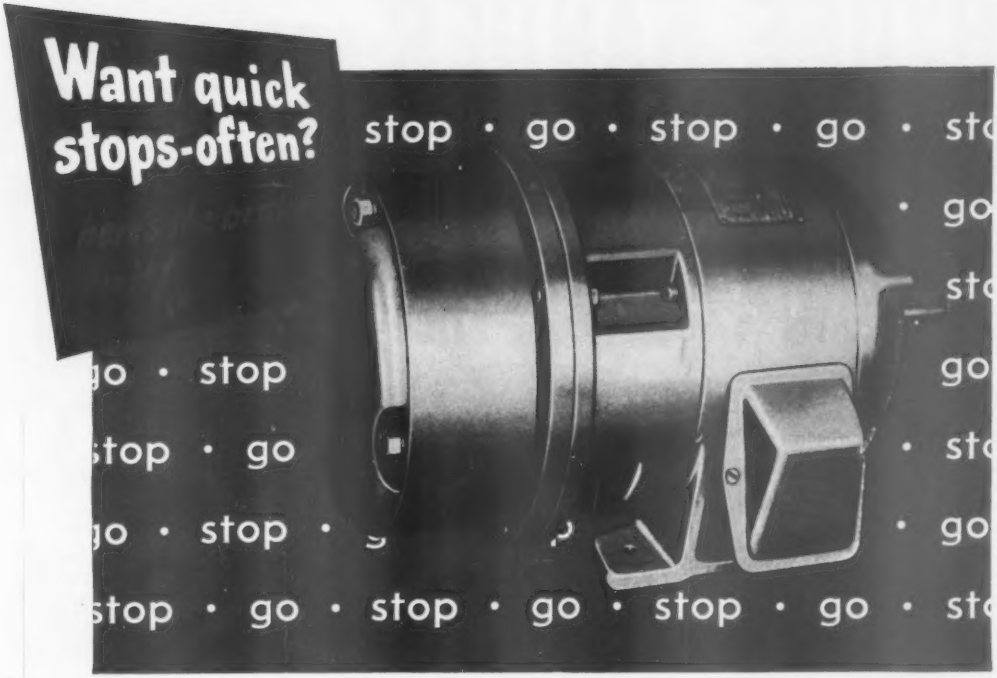

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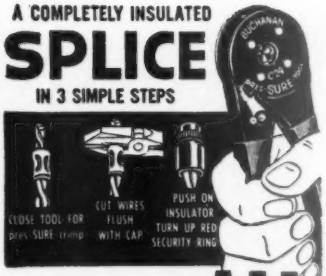

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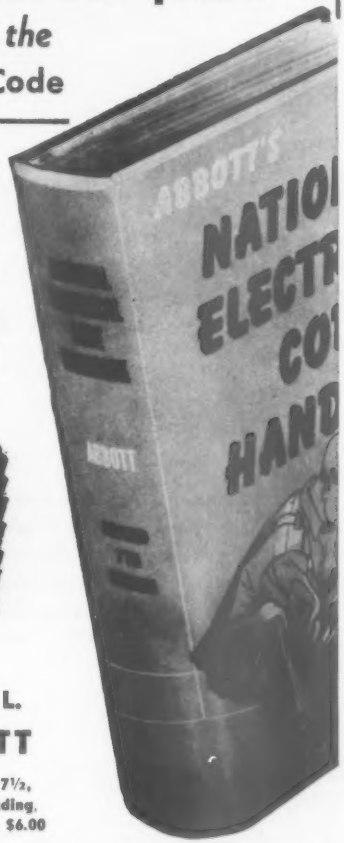

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All the tables of data

which must be referred to frequently by users of the Code have been placed together in the last chapter in order to make them most convenient for quick reference. Here are tables of simplified data applying to the wiring and protection of motors of all ordinary types, sizes, and voltages; a table for calculating voltage drop; etc.

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A few minutes attention to the Key to the Code on the cover and flyleaf will give the reader a better idea of the scope and contents than could be obtained by two hours' study of the Code itself.

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9. Schedule Charging Operations to Avoid Down-Time.
10. Do Not Overcharge Batteries.
11. Locate Your Charging Stations Strategically.
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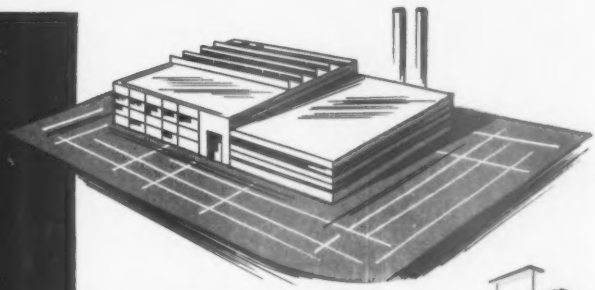

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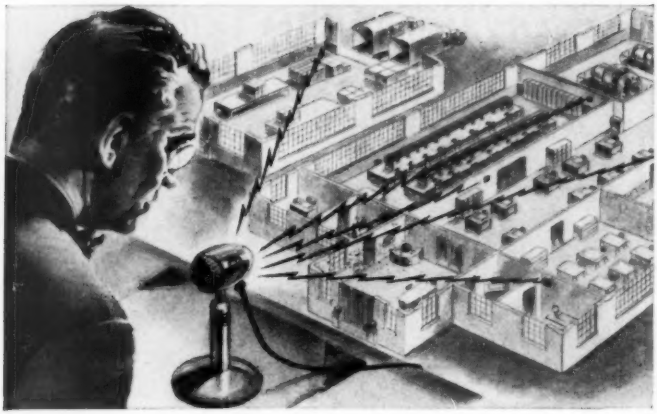

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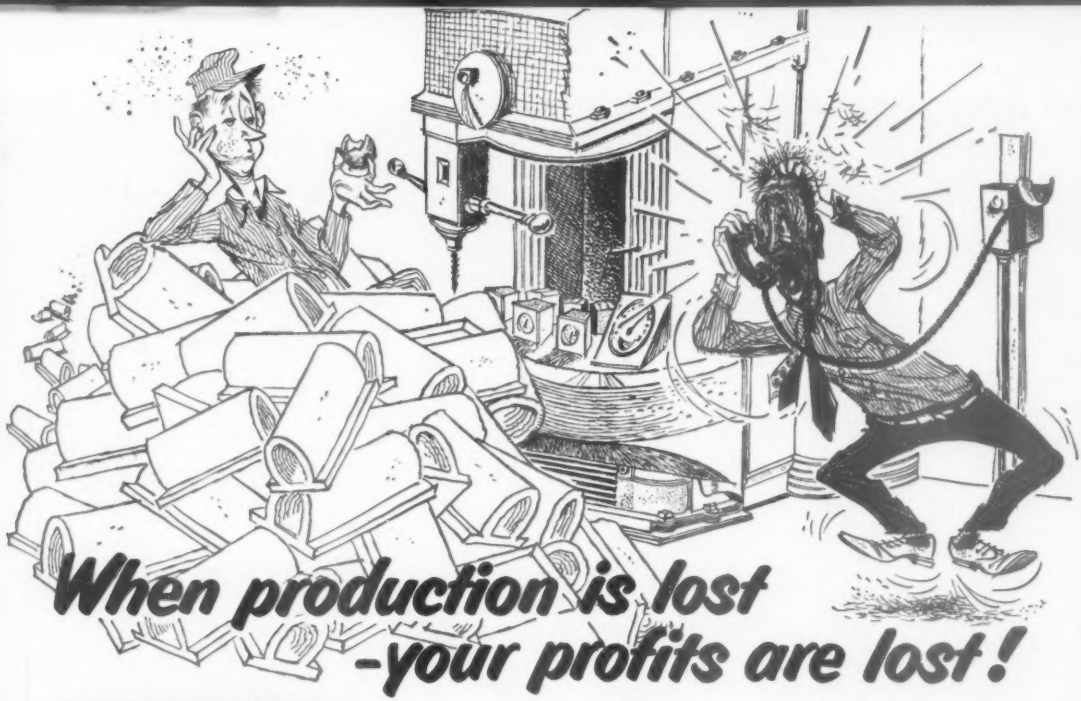

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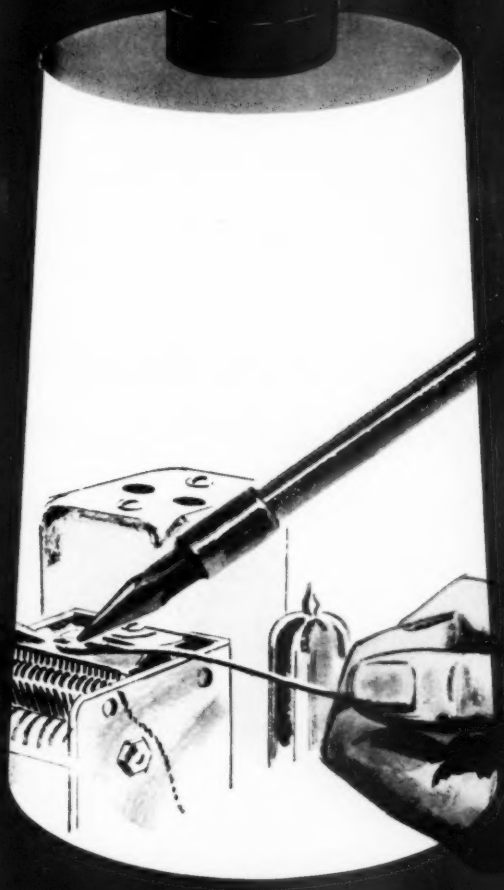

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So, if you're a maker or user of electrical equipment, remember to specify FIBERGLAS.

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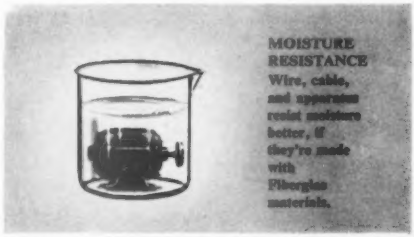

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Wire, cable, and apparatus resist moisture better, if they're made with Fiberglas materials.

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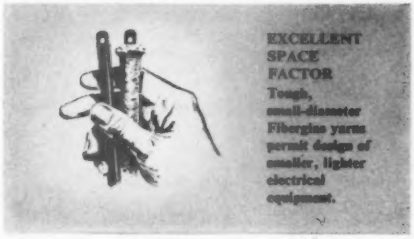
Fiberglas insulating materials resist the ravages of oils and acids.



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Tough, small-diameter Fiberglas yarns permit design of smaller, lighter electrical equipment.

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Even in small diameters, Fiberglas yarns have higher tensile strength than any other insulating textile.

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Defense Production

makes more important than ever the Specification of Lighting Units that meet

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for Efficiency, Durability and Uniformity

Vital to defense and essential civilian production, are lighting units that *can be depended upon* to provide the right quantity and quality of light, economically, dependably and with a minimum of servicing need and maintenance cost.

Defense production demands lighting equipment with the ability to *sustain its rated light output* efficiency over hundreds of cleanings so that the proper high illumination levels may be maintained. It demands the *durability* found so essential to industrial lighting and the avoidance of production interruptions and inefficiency due to abnormal wear, distortion or breakdown. It demands fullest *protection from glare* through proper diffusion and shielding.

All of these, and many other conditions for proper lighting of defense plants can be met through the specification of RLM-Labeled Lighting Units. All units bearing the RLM Label are warranted by Electrical Testing Laboratories to conform to the minimum standards established by the RLM Standards Institute for efficiency, durability and uniform quality.

FREE RLM BOOKLETS containing complete specifications for all RLM-Certified Industrial Fluorescent and Incandescent Lighting Units and the names of all manufacturers of RLM-Labeled Units may be obtained by writing: RLM STANDARDS INSTITUTE INC., Suite 829, 326 West Madison Street, Chicago 6, Illinois.

Specification of RLM-Labeled Units Assures Conformance to ALL these Essentials of Defense Production Lighting

DIFFUSION WITH HIGH REFLECTION FACTOR
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RLM Reflectors are built of not less than .032" reflector steel covered with .025" fused on porcelain enamel that will not chip, corrode or deteriorate under industrial operating conditions.

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Reflector design of RLM Units conforms to specifications embodying approved practices of illuminating engineering.

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RLM Standards specify the use of certified ballasts which last longer, because they are designed to prevent excessively high temperature operation.

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RLM Standards insist on the maintenance of uniform quality as to materials and construction, thus assuring the buyer of uniform lighting performance from each unit installed.

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The letters RLM stand for Reflector and Lighting Equipment Manufacturers

B6510

"Electrical Equipment for Today's Plant"

TAKE A LOOK AT

FACTORY'S

LISTING OF

"THE BEST CATALOGS OF THE MONTH"

You'll find

plenty of help

on electrical and other plant

operating problems.

This month,

it starts on

page B-124.

It's another

FACTORY

feature

SOFT

...or LOUD

Signals do the directing...

FARADAY KODAIRE

The noisy part of the plant responds to the air blast signal of Faraday Kodaire. Where sound levels are high or varied, it commands attention with a high powered trumpet blast—perfect for mills, foundries, industrial plants, either inside or outside. Try it on your next new or replacement job.

...OR BUZZERS

Where noise levels may not be quite so varied or loud, the Faraday Buzzer is a perfect signal. It provides a sharp buzzer tone at high frequency which can be easily increased or decreased by a simple screw adjustment. Fits Uni-Pact adapter plate and can be incorporated into the famous Faraday Unipact system. Write for Sperti Faraday Signal Catalog.

Sperti Faraday Inc.

ADRIAN, MICHIGAN

BELLS • BUZZERS • HORNS • CHIMES • VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

uperior Plant Wiring for "Hot Spots"...

Rome Synthinol® 901

THERMOPLASTIC INSULATED WIRES AND CABLES

Whenever your electrically operated equipment is subjected to extreme heat, moisture or corrosive conditions, it will pay you to "wire up" with Rome Synthinol 901 wires and cables. They have proved far superior for equipment wiring as well as for feeders and branch circuits in steel mills, chemical plants, oil refineries and other "hot spots."

A resin plasticized polyvinyl chloride type of insulation, Rome Synthinol 901 provides longer service life under high operating temperatures. It also offers exceptional resistance to moisture, oils, greases and chemicals. Underwriters approved for 600 volts at 90° C. when used as an appliance lead wire.

OTHER ROME SYNTHINOL APPLICATIONS:

Rome Synthinol, Type TW—This small diameter building wire is approved by the Underwriters' Laboratories, Inc. for use in wet locations under the rules of the National Electrical Code.

Rome Synthinol Machine Tool and Control Wire—Adopted as standard wiring by machine tool manufacturers for extreme durability and excellent resistance to oils, acids, alkalies, common cutting solvents and flame. Underwriters' Laboratories approved as Type TW, with end use approval for 80° C. operation in air; 60° C. where exposed to oil and in wet locations. Conforms with National Machine Tool Builders' Association Standards. Send for the Rome Synthinol Bulletin.

Copper wire mill products are a Controlled Material under N.P.A. Controlled Materials Plan . . . USE YOUR CMP ALLOTMENT.

It Costs Less to Buy the Best

ROME CABLE CORPORATION, Dept. FM-4, Rome, N. Y.
Please send me your Rome Synthinol Bulletin.

Name .....

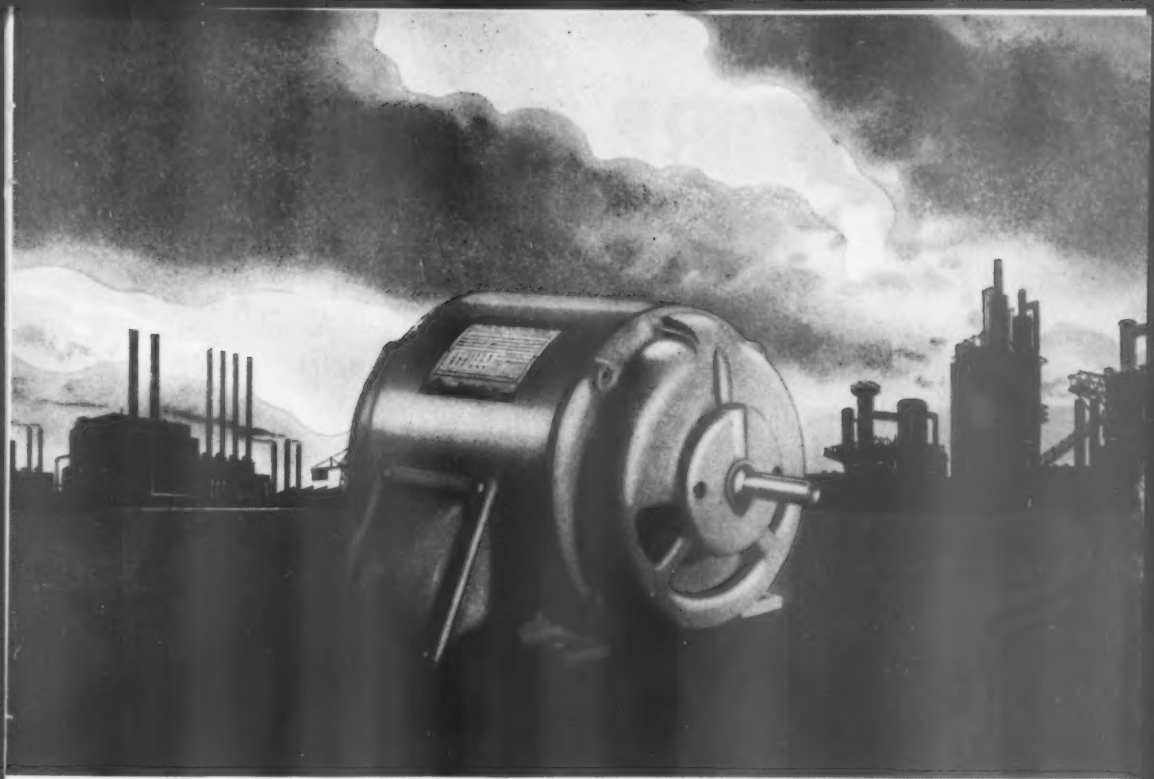
Company .....

Address .....

City ..... Zone ..... State .....

Corporation

"Electrical Equipment for Today's Plant"



Emphatically— all motors are NOT ALIKE!

Some time ago, Reliance startled many people by challenging the old chestnut . . . "all motors are pretty much alike". We have since offered proof that all motors are *not* alike by showing how PRECISION-BUILT A-c. Motors are made differently — to deliver dependable power longer. Reliance is always anxious to have interested visitors see our modern plants and the many extra precision steps which account for the big difference in these motors. But if it isn't practical for you to make such a visit, just call in a Reliance Sales Engineer and you will see pictures, charts and hard facts which are turning more and more motor users into Reliance customers. Ask for Bulletin B-2101 (A-c. motors from 3/4 to 300 hp.).

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

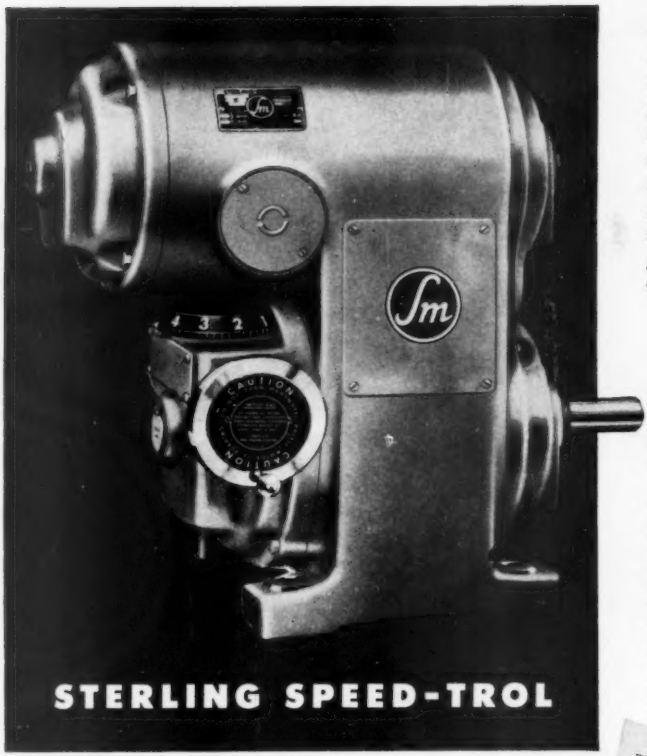
1070 IVANHOE ROAD, CLEVELAND 10, OHIO

MADE BETTER IN MANY WAYS

- to deliver dependable power . . . *longer!*

B-64

30% MORE PRODUCTION
40% MORE JOBS WITH



STERLING SPEED-TROL!

Replacement of single speed motors with Speed-Trol variable speed drives on punch presses at the Los Angeles factory of Square D Company resulted in the following advantages, reports L. C. Maechtlen, Vice President: Production increased 30% ... spoilage or rejects reduced 10% ... presses adapted to 40% more jobs ... 100% synchronization of punch press speed and operator's ability ... employee morale greatly improved.

STERLING SPEED-TROL GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

EQUIPMENT ADAPTATION TO: Sequence synchronization—operators' abilities—load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

PROCESS CONTROL OF: Temperature—viscosity—level—pressure—flow—etc.

TIME CONTROL OF: Baking—drying—heating—cooking—pasteurizing—soaking—chemical action—etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality and profit

OTHER STERLING ELECTRIC POWER DRIVES:

- **STERLING SLO-SPEED (GEARED) MOTORS**
- **STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS**

DRIP-PROOF • SPLASH-PROOF • TOTALLY ENCLOSED

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. A 103.

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile.
Offices and distributors in all principal cities.

"Electrical Equipment for Today's Plant"

DON'T PAY A PENNY

...for fluorescent tubes until you've tried Sylvania's. Your money back if you don't agree they're finest!

Try 24 Sylvania Fluorescent Tubes of any popular type. If they don't give more light and maintain color and brightness for a longer time than any other brand, send them back with your signed Certificate of Assurance and your money will be refunded.

Here's *why* Sylvania Tubes are finest

A pioneer in fluorescent lighting, Sylvania has further established its leadership by 2 important developments:

1. Coil Coatings which contain closely controlled amounts of Zirconium Oxide . . . a major factor in enabling Sylvania to triple the rated life of its fluorescent tubes.

2. Better Fluorescent Powders developed from highly critical proportions of selected minerals, and applied by improved methods to assure uniform thickness on the glass tubing, resulting in more even light for a longer time.

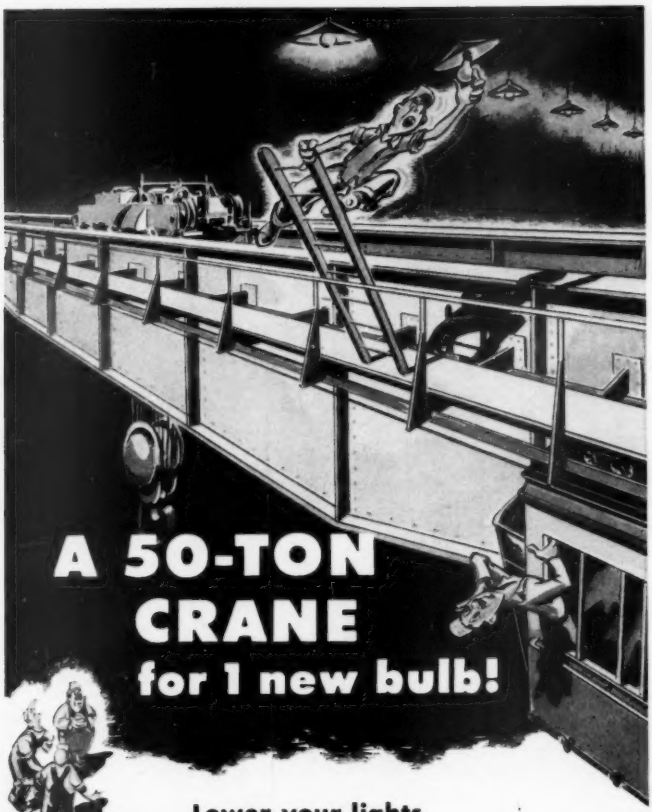
Look for this sign! It identifies a Qualified Lighting Contractor ready to offer you expert service and Sylvania quality tubes and fixtures.

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

"No Plant is Better than its Electrical Equipment"



A 50-TON CRANE for 1 new bulb!

Lower your lights for lower maintenance costs

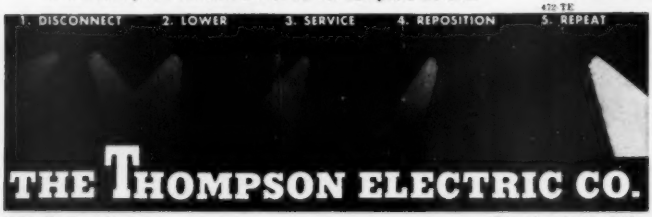
Using two men and a crane to maintenance overhead lights is like sending *two men and a tractor to carry a wrench.* For efficient servicing of high-bay lights, **there is no faster, safer means than THOMPSON disconnecting and lowering hangers!**

Lighting maintenance costs come down with the lights, and new safety records are set by service crews when **THOMPSON** hangers are installed. Simple manual control is exercised from floor level.

Don't service your overhead lights by costly or hazardous means . . . **install THOMPSON hangers and save money!**

Write today for CATALOG No. 50 for complete details.

4721 TE



THE THOMPSON ELECTRIC CO.

1121 Power Avenue • Cleveland 14, Ohio

EVERY MONTH

in

FACTORY

. . . . . .

Be sure to read

"JOE'S DEPART-MENT"

. . . . . .

It's

crammed full of practical ideas

every plant operating man

can use

to improve

his electrical operation.

It's another

FACTORY

Feature

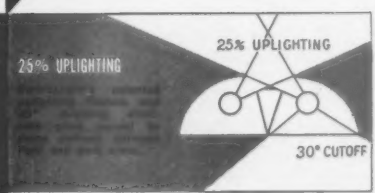
"Electrical Equipment for Today's Plant"

NOW

FOR THE FIRST TIME

which
which
which

THE **A·L·S** *SLIMLINE*



America's finest fluorescent fixtures

Smithcraft

LIGHTING DIVISION

CHELSEA 50, MASSACHUSETTS

4th International Lighting Exposition in Cleveland (May 6-9).

What Is "Communication by Telescriber"?

(Reading time — 80 seconds)

What Is A Telescriber?

A telescriber is a communication instrument which instantly transmits messages in the sender's own handwriting, from one point to one or more remotely located stations.

Where Are Telescriber Systems Used?

In any organization (regardless of size) where there is a need for instant, frequent, accurate written contact between departments or buildings.

Are All Messages Received At Each Remote Station?

Selector keys permit complete system flexibility. Messages are received only by those stations chosen by the writer. All messages and signatures are in the same handwriting as the original.

Can Business Forms Be Used In The Telescriber?

Yes. The TelAutograph 'Instan-Form' telescriber is available where **instant** communication on business **forms** is desired.

What Are Some Accepted Uses of TelAutograph Telescribers?

Production and Quality Control • Material Handling • Sales Order • Maintenance Control • Dispatching • Central Files • Work-In-Process, etc.

Can I Determine Whether A Telescriber System Would Improve Our Operation?

A "Communications Guide" is available without cost to aid you in analyzing your different communication problems.

Can We Get Further Assistance Without Becoming Obligated?

Yes. It is standard TelAutograph Corporation policy to have its field staff aid in making analyses and offering recommendations. **This is done without pressure or obligation.**

How Can We Obtain The "Communications Guide" And Other Information?

Send your request to Department B-24 at the address below. It will be honored promptly.

TelAutograph CORPORATION

16 West 61st Street • New York 23, N. Y.

Telescriber TelAutograph Service *

Instan-Form *

*Trade Mark

"What a variety of packaging machinery Standard-Knapp makes . . . machines for packing gum to packing 300-lb. TV sets. It's a changing, growing field that needs a flexible, expandable power distribution system. We chose Trumbull's FLEX-A-POWER because this system of pre-fab busways, in standard lengths, could be taken apart, added to or decreased to meet expanding or contracting power needs. A few thousand dollars' worth of FLEX-A-POWER was installed when we built our first plant years ago, and many thousands of dollars more have been added since then. That's real flexibility—with no waste. Not a single FLEX-A-POWER length or tap-off device has been obsoleted. Let me show you how it works . . .

BILL SCHAEFER, ENGINEERING CONSULTANT FOR STANDARD-KNAPP, DEMONSTRATES—

The power distribution system of the future—in action today!

"We get power where it's needed, *when* it's needed, at presses and machine tools located at many different points," explains Schaefer, "by this method: LVD (Low Voltage Drop) FLEX-A-POWER feeds this packaged Trumbull Centr-A-Power switchboard from an outside transformer, then a network of FVK FLEX-A-POWER, the secondary or plug-in distribution system, takes off from there and criss-crosses the whole plant. There's an FVK outlet every foot of the way.

"It's so much easier and more economical to install than wiring and conduit," points out Schaefer. "There's no expensive rewiring, either, when relocating loads. Just dismantle FLEX-A-POWER, move it to the desired location and reinstall it—with practically 100% reuse of materials. It's the only method that permits quick changes in machine layout without delay for rewiring. Yes, sir, the power distribution system of the future is a present reality!"

There's a FLEX-A-POWER type for your application—whether multi-story building or industrial. Though FLEX-A-POWER is now mainly for defense, the present's the time to plan for your future power needs. Write for full data.

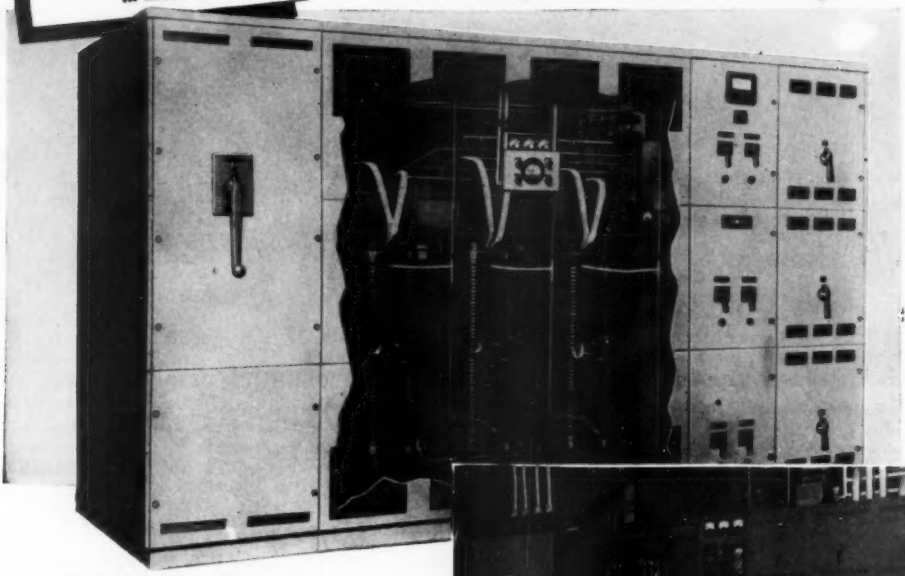
Trumbull Assures FUTURE FLEXIBILITY *in Power Distribution*

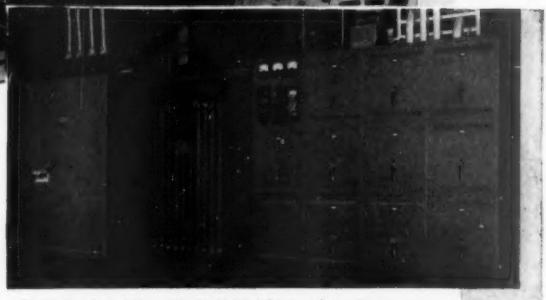
TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONNECTICUT

Wagner
TRANSFORMERS
...the choice of leaders in industry

always specify...





Oil filled and non-inflammable liquid filled (Noflamol) transformers are available with various types of entrances and controls for high-voltage circuits, and with throats on the secondary side, in ratings up to 2000 kva.

Wagner
UNIT SUBSTATION TRANSFORMERS
for dependable load-center power distribution

The importance of the transformers in your plant power distribution system cannot be over-emphasized. If a switch or a circuit breaker fails, only a part of the system is affected—but if the *transformer* fails, the entire system is dead. Wagner Unit Substation Transformers assure a continuous, dependable flow of power.

Wagner three-phase dry-type load-center transformers are built in ratings through 2000 kva in the 15-kv class and below. Transformer and incoming line section are housed in compact factory-matched enclosures, designed for direct connection to matching secondary switchgear to form a closely coupled unit substation that is streamlined in appearance and readily accessible. Complete enclosure of all equipment assures safety against contact with live parts.

Wagner Dry-Type Unit Substation Transformers are for indoor installation in dry, clean, well ventilated locations. Because of their relatively light weight they can be used in multi-story buildings. Wagner Liquid-Filled Unit Substation Transformers are available for indoor or outdoor installation.

Bulletins TU-56 and TU-13 give full information on Wagner Dry-Type and Liquid-Filled Substation Transformers. Write for your copies.

WAGNER ELECTRIC CORPORATION
6412 Plymouth Ave., St. Louis 14, Mo., U.S.A.

®Wagner Electric Corporation EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

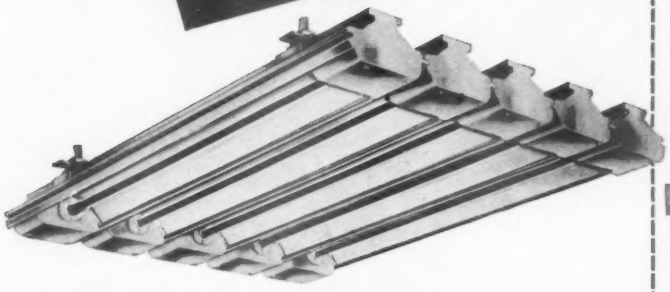
1184

"Electrical Equipment for Today's Plant"

CHROMALOX *gives you* the LOW COST answer

for

non-breakable



CHROMALOX

all-metal electric radiant heaters

Get all the advantages of infrared heat and more—at a fraction of former costs with the new and improved CHROMALOX heating principle. All-metal construction, high heat intensity, infrared radiation that's "color blind" and heat that's infinitely variable, have proved CHROMALOX Radiant Heaters superior for over 300 different uses in more than 1500 plants. If you use heat for baking, drying, preheating, curing, degreasing and similar applications, CHROMALOX Radiant Heaters can very likely give more satisfactory results. See for yourself how these infrared units up output, improve uniformity, reduce costs.

CHROMALOX

Electric Heat for Modern Industry

Time, money and material saving applications

FOR MORE INFORMATION
CHECK, CLIP AND MAIL COUPON

PLASTICS
- ☐ Drying powders
- ☐ Drying Cellophane
- ☐ Preheating strips
- ☐ Preheating cloth
- ☐ Curing vinyl
- ☐ Post-forming
- ☐ Curing tubing

METALS
- ☐ Heating molds
- ☐ Degreasing
- ☐ Paint baking
- ☐ Drying piston rings
- ☐ Baking wrinkle paint
- ☐ Welding preheating
- ☐ Drying automotive parts
- ☐ Preheating steel rolls
- ☐ Dehydrating refrigeration coils

GLASS
- ☐ Drying bottles
- ☐ Heating safety glass
- ☐ Setting dye on glass cloth
- ☐ Preheating lenses
- ☐ Drying mirrors

ELECTRICAL
- ☐ Baking armatures
- ☐ Drying marine equipment
- ☐ Sealing headlights and television tubes
- ☐ Drying varnished wire
- ☐ Drying carbon resistors
- ☐ Drying color coding

FOUNDRIES
- ☐ Drying sand cores
- ☐ Skin drying of molds
- ☐ Comfort heating

FOOD
- ☐ Warming
- ☐ Drying baking pans
- ☐ Dehydrating crackers
- ☐ Baking biscuits
- ☐ Dehydrating coconuts

TEXTILES
- ☐ Dehydrating braided material
- ☐ Drying Nylon thread
- ☐ Dehydrating woolen cloth
- ☐ Setting flock

RUBBER
- ☐ Curing
- ☐ Heating rubber glue
- ☐ Curing latex

PRINTING
- ☐ Ink drying
- ☐ Static elimination
- ☐ Glue drying
- ☐ Drying varnished paper
- ☐ Silk screen drying

CERAMICS
- ☐ Drying frit
- ☐ Drying glaze
- ☐ Drying pottery

MISCELLANEOUS
- ☐ Sealing storage batteries
- ☐ Setting adhesives and cements
- ☐ Curing tobacco
- ☐ Melting wax
- ☐ Drying photographic negatives and prints
- ☐ Dehydrating kraft paper

and many other Applications

EDWIN L. WIEGAND CO. Radiant Heater Division
7518 Thomas Boulevard, Pittsburgh 8, Pa.

I am interested in infrared heat for_____

_____

- ☐ Send me application file on uses I have listed.
- ☐ Ask factory representative to contact me.
- ☐ Send Chromalox Catalog on Industrial Heaters.

Name_____

Company_____

Address_____

City_____ Zone____

State_____ IC-61

"No Plant is Better than its Electrical Equipment"

"Electrical Equipment for Today's Plant"

Whips Trouble Spots Throughout Industry

"NEITHER VIBRATION NOR MOISTURE ARE PROBLEMS NOW," SAYS THE RICHARD ORE CO. "We installed 7 Westinghouse Life-Linestarters® in a particularly difficult application, a mine concentrating mill. We were off to a flying start immediately—the Westinghouse Life-Linestarter is easier to install because of straight-through wiring and the arrangement of breaker and starter in a single enclosure. Outages due to moisture and vibration have been virtually eliminated. That had been our biggest headache. 10 more Life-Lines will be installed shortly."

"WE HAVE MORE PROTECTION FROM MOISTURE," SAYS THE ELLICOTT MACHINE CORP. "In dredges and dredging machinery, protection from moisture is of the utmost importance. Your Bonderized® starter cabinets certainly do that job well—we don't worry about it."

"COIL CHANGES MUCH FASTER NOW," SAYS THE BAHNSON CO. "We were curious to know if Life-Linestarter coils actually could be changed faster. A time study was made upon arrival of the first shipment of starters. We're happy to say that coils are not only easier and quicker to change, but there is less chance of damaging other parts."

"EVEN SLAMMED IT WITH A HAMMER," SAYS THE SPRING PERCH CO. "Our plant had one particular machine that vibrated so much the starter units had to be changed from time to time. But your Westinghouse Salesman proved the real strength and durability of the Life-Linestarter. He asked me to slam it with a hammer, which I did. The contacts still remained closed—proof enough for me that this starter could take any vibration."

"STRAIGHT-THROUGH WIRING ANSWERED MY PROBLEM," SAYS THE BAKER REFRIGERATION CORP. "We have a new air-conditioning design that requires the use of two starters. We found that the Westinghouse Life-Linestarter, with no wiring on the back, could be more easily mounted in a group within our enclosure—saves assembly labor. This completely sold me on your straight-through wiring."

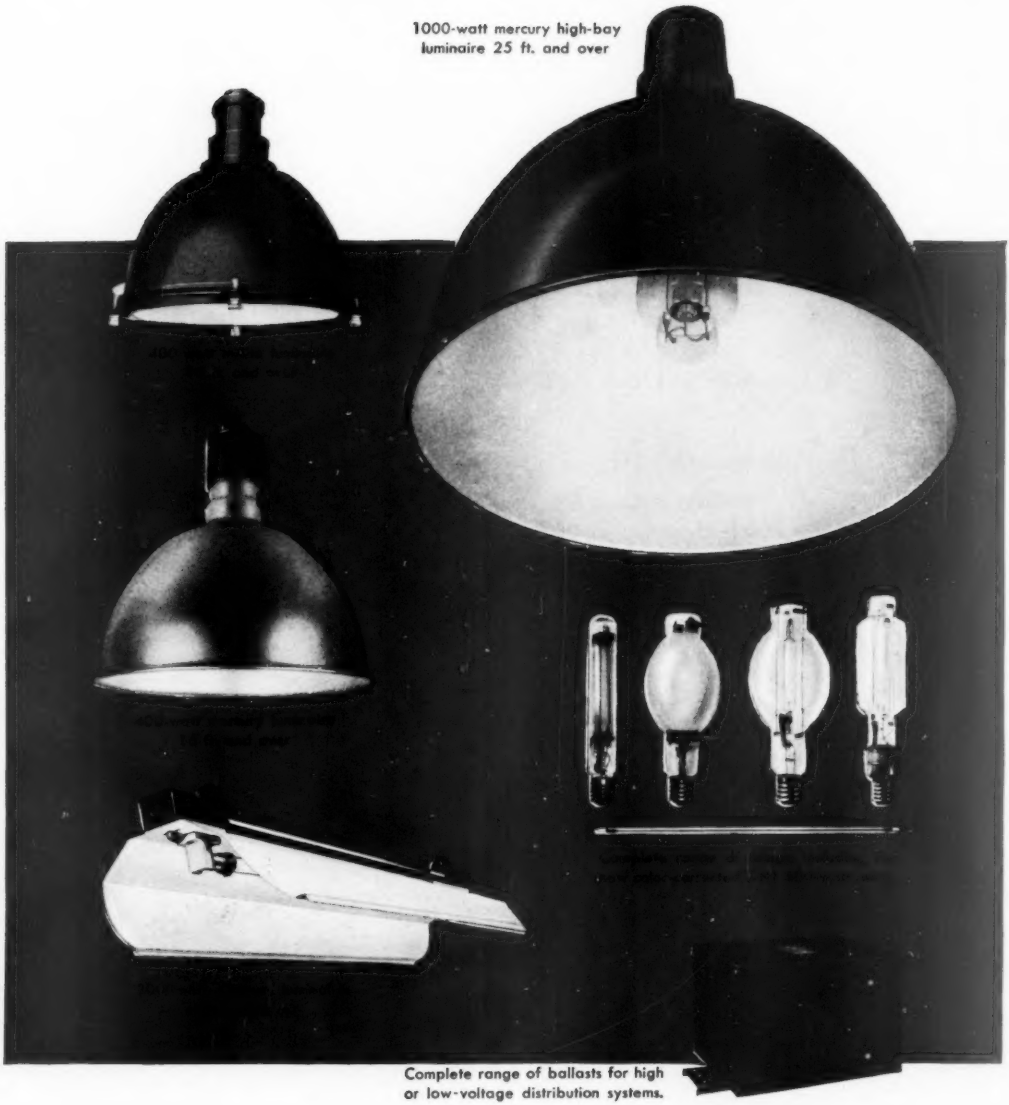
Want more information? Simply contact your nearest Westinghouse Representative and ask him for all the facts. Or write for Booklet B-4677, "Tomorrow's Starter Today", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-30073

"No Plant is Better than its Electrical Equipment"

EMPLOYEES SAY,

1000-watt mercury high-bay luminaire 25 ft. and over



Complete range of ballasts for high or low-voltage distribution systems.

"Better than daylight"

"We get over 50 footcandles evenly distributed in this work area—and have completely eliminated the need for auxiliary lighting," says Chief Electrician of an Ohio plant about their new main high-bay-assembly area.

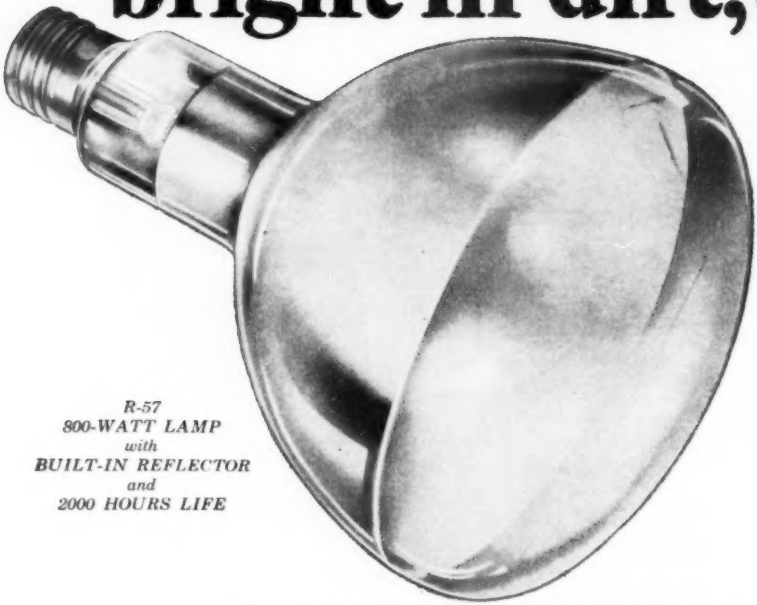
What's more, he further states that the employees report, "It's even better than working in daylight . . . there are no shadows or glare." A Westinghouse combination mercury-incandescent system takes credit for these results.

He concluded, "We have always believed that high-quality illumination pays for itself in more and better work, fewer errors . . . and this installation, made according to a plan, proves that it does just that." Only Westinghouse can offer you the complete mercury system—luminaires, lamps, and ballasts.

It will be well *worth your while* to investigate Westinghouse, where you can review all sources and all types before selecting one system. Get B-4727, "Lighting at Work" in every industrial area. Call your nearest Westinghouse Office or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-04298

"No Plant is Better than its Electrical Equipment"

New Westinghouse bright in dirt, dust,



R-57
800-WATT LAMP
with
BUILT-IN REFLECTOR
and
2000 HOURS LIFE

Now you can get bright light *longer* in high-bay areas, no matter how dirty, dusty or smoky the conditions. The new Westinghouse R-57 800-watt standard voltage lamp, with a special silvery reflector actually built inside the bulb itself, prevents dirt particles from reducing its highly efficient light output. Dust settles only on the sides, not on the light-emitting face, so no cleaning is needed.

In addition, the new R-57 lamp lasts 1000 hours longer than conventional lamps and directs all the light on the area where it is needed. It is available in two light distribution types: narrow or wide beam.

For full information, contact the Westinghouse Lamp Sales Office nearest you. Or simply mail the coupon below.

LAMP DIVISION • WESTINGHOUSE ELECTRIC CORPORATION • BLOOMFIELD, NEW JERSEY

YOU CAN BE SURE...IF IT'S

Westinghouse

"Electrical Equipment for Today's Plant"

lamp stays and smoke

ACTUAL EFFICIENCY STUDIES PROVE new Westinghouse R-57 800-watt lamps out-live, out-perform conventional lamps. And their special design makes them ideal, especially for high-bay lighting in foundries, mills and other industries where dust is a problem.

R-57 WESTINGHOUSE LAMPS have built-in reflector, stay bright longer with no cleaning; give more efficient light at lower cost.

AGAIN WESTINGHOUSE MAKES HISTORY! Brings you complete coverage of Presidential Campaign from conventions to election over CBS television and radio . . . Also tune in WESTINGHOUSE STUDIO ONE every week over CBS-TV.

WESTINGHOUSE LAMP DIVISION DEPT. 532
BLOOMFIELD, NEW JERSEY

I'd like to have more information about the new Westinghouse R-57 800-watt lamp.

NAME.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

NEWS FROM WESTINGHOUSE, THE FASTEST-GROWING LAMP MANUFACTURER B-77

by Sam Hibben

DID YOU KNOW? Owls see in near-darkness (not in total darkness, which almost never exists outdoors) because of the nature of their eyes and not the size of them. Because of two shapes of nerve-ends in the back of the eyeball, we say that humans have both "rod" vision and "cone" vision. The rods take over in dim light while the cones function in brighter light and give us color perception. Owls, cats, and other night-life have mostly or entirely "rod" vision, hence see moving objects in the dimmest lights, because apparently the nerve-rods work in bunches, thus multiplying the sensitivity.

ON THE OTHER HAND—While blackout driving proved possible but unsatisfactory in war-time, the effort of auto safety experts is to approximate daylight seeing conditions as nearly as possible—at least to make roadway objects visible as far ahead as it takes to stop your car—roughly 300 feet. Headlights today are so highly scientific that a pair of small 45-watt filaments illuminate a road area at least 20 times the largest living room. Their complexity is shown by the fact that Westinghouse Sealed Beam Headlamps, for instance, have 121 individual prisms, and all of these direct separate beams of light picked up from various parts of the reflector. I guess that makes them about 60 times as complicated as bi-focals, no?

SAFETY NOTE: If you ever blow a fuse in your car on a busy highway at night, illuminate the interior of your car with a flashlight; it makes the windows visible for a long distance, warns other motorists.

More next month.

Samuel G. Hibben

BUY NOW AND SAVE! WESTINGHOUSE FLUORESCENT LAMPS STILL COST YOU LESS THAN THEY DID IN 1940, YET BURN SEVEN TIMES LONGER!

"No Plant is Better than its Electrical Equipment"

Don't Bargain-Shop for Service . . .

It takes *more* than on-the-spot repair to provide sound maintenance for heavy electrical equipment. *Real* service economy comes when Field Repair is *coupled* with Field Inspection—handled by factory specialists who will catch potential trouble early . . . take protective steps now. This combination is *Field Service.*

This is why Westinghouse operates 46 Field Service offices, and staffs them with experienced apparatus engineers. Through them, a part of the headquarters factory moves into your plant to inspect and test, adjust or repair your apparatus . . . and recommend major overhauls when they are needed. These engineers use the most modern repair and testing equipment. They can do the entire job—or will work with your own personnel.

Field Service, however, is only one phase of a *complete* maintenance program offered by Westinghouse. It also operates 31 Renewal Parts Warehouses, stocked with precision-built parts . . . plus a network of 36 Repair Plants, expertly manned and equipped for *all* types of electrical apparatus repairs.

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

SEE TELEPHONE LISTING ON PAGE B-80

Field repair alone . . . is not enough !

These services are backed by factory-tested methods, factory-approved materials, factory-trained specialists. They offer the finest in *service protection* . . . the best in *service economy.* Your proof is in the performance of the completed job.

For more information, write today for a free copy of Westinghouse Maintenance Booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pennsylvania. J-95159

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For complete information, turn to page B-78, B-79
*** Apparatus Repair Plant ‡ Field Service Office § Renewal Parts Warehouse**

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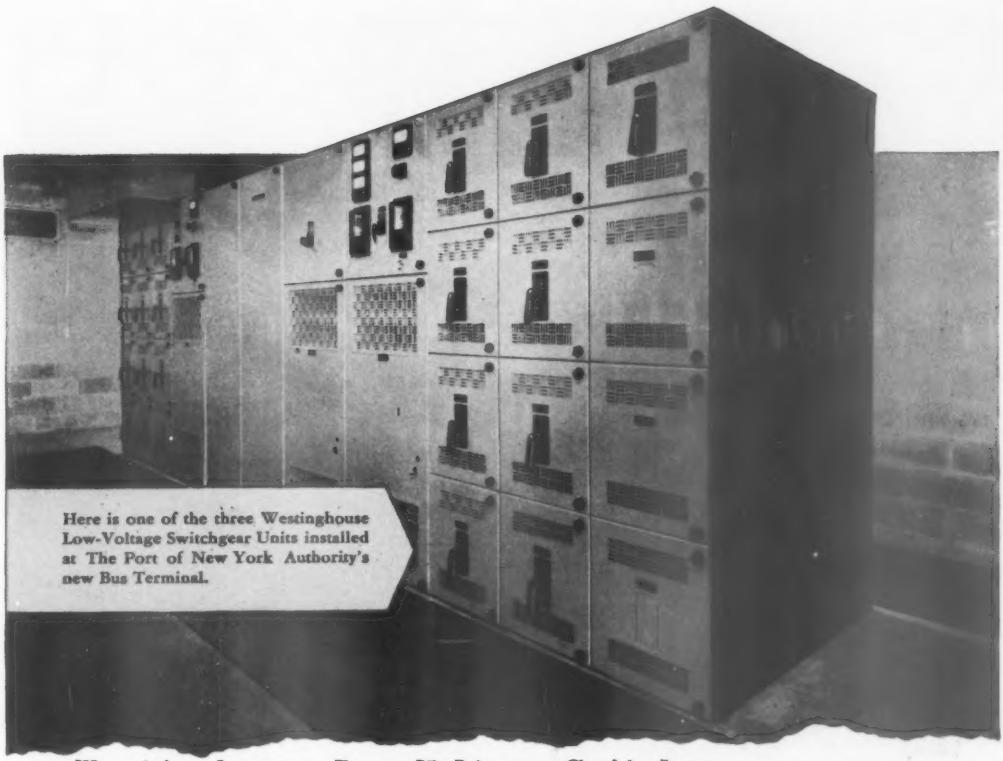
"Electrical Equipment for Today's Plant"



Here is one of the three Westinghouse Low-Voltage Switchgear Units installed at The Port of New York Authority's new Bus Terminal.

Westinghouse Low-Voltage Switchgear serves modern, new Bus Terminal of The Port of New York Authority

In making this new Bus Terminal the most functional, most modern of its kind, The Port of New York Authority sought to achieve improvements in every phase of terminal operation. With so much depending on electrical power, the protection of vital electrical services was naturally a prime consideration. Note what this user has to say about Westinghouse Low-Voltage Switchgear which was selected for this key function.

"The installations have contributed to the maintenance of unusually good service continuity. Also, our operating personnel have particularly praised the electrical and mechanical interlocking features which assure maximum safety. Maintenance has been negligible."

For installations in central stations, industrial plants or large commercial buildings, Westinghouse Low-Voltage Switchgear offers you this same safe, low-cost means of protecting vital electrical services.

For complete information send for Booklet B-2296-D. Contact your Westinghouse representative, or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60766

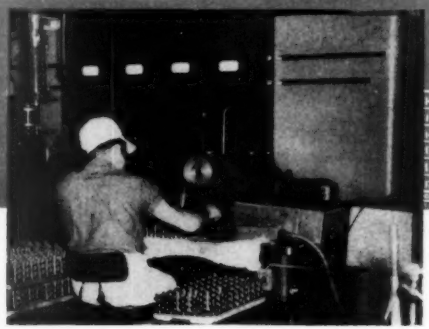
Westinghouse

LOW-VOLTAGE SWITCHGEAR

"No Plant is Better than its Electrical Equipment"

Why MAYTAG uses RF HEATING for BETTER, FASTER, CHEAPER PRODUCTION

NOTES -
1. MATERIAL - A.I.S.I. C1141 OR C1144 STEEL.
2. INDUCTION HARDEN TEETH ONLY .015 TO .030 DEEP, ROCK. "A" 80-84.
3. REMOVE BURRS.
4. CONCENTRICITY OF P.D. AND CENTER BORE TO BE WITHIN .002 TOTAL INDICATOR READING.
6.4 M/M (.252) +.004 -.000 DIA. HOLE
REMOVE BURRS,
HOLE MUST NOT BE OFF CENTER
INDUCTION HARDENED TOOTH AREA
SECTION A-A
12 DIAMETRAL PITCH
16 TEETH
1.333 P.D.
1.500 OUTSIDE DIA.
SCALE 10:1
.015 TO .030 CASE AT THIS POINT.
DETAIL OF TOOTH HARDENING
.046 WIDE
SECTION SHOWING UNDERCUT (4:1 SCALE)
Y-14434 7180
SEE NOTE
5-17-48
GYRATOR PINION
THE Maytag CO. NEWTON, IOWA
2-10054
FULL



● The Maytag Company has found, for fast production at low cost and high quality, Westinghouse RF Heating installations are the answer.

The installation of a process using two 20 KW-450 generators—for both spline and straight shaft hardening—has paid for itself in *less than 3 months!* This was shortly after World War II, and since then continued use has piled up real profit in savings.

In building a new plant for production of a completely new line of automatic washing machines, Maytag turned to induction heating for brazing and hardening . . . and they specified Westinghouse. A 50 KW and 10 KW RF generator, with associated work handling equipment, are now accounting for still further savings and continued high quality. That's why Maytag says that not only is the Westinghouse RF process the best method for heat treating production parts, but, also, "it produces precision work at the price of rough and ready work."

As we helped Maytag, let us help you solve your problems of increased production at low cost and with high quality. By all means, investigate the possibilities of installing Westinghouse RF Heating.

Westinghouse Electric Corporation
Department F-41
2519 Wilkens Avenue · Baltimore 3, Maryland

Send me your informative case history booklet on induction heating.

Name.....

Company.....

Street.....

City.....Zone.....State.....

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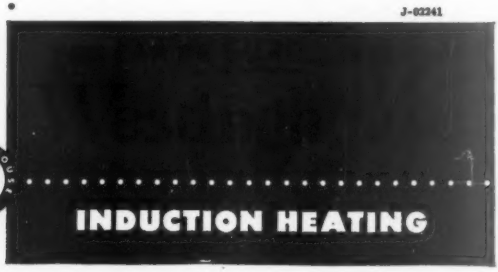

FACTORY
MANAGEMENT AND MAINTENANCE

FORECAST:

FACTORY OF THE FUTURE

WHAT IT WILL LOOK LIKE

By J. K. GANNETT, Vice President and Director, Engineering and Research, and A. T. WAIDELICH, Vice President and Manager of the Research Division, The Austin Company, Engineers and Builders

HARDHEADED BUSINESS CONSIDERATIONS are injecting a new group of engineered values into industrial facilities.

In the development of new materials and techniques, plant designers are starting to challenge the lead held by producers of building materials and equipment.

- **All are seeking greater building efficiency and speed.**
- **Flexibility and economy are universal objectives.** Standardization and integration are the means of attaining them.
- **The galloping advance of electronics** is projecting mass production industries toward automation and giving a new dimension to materials handling functions.
- **The outlook for atomic power** — for its availability as an independent transportable source of capsuled energy — opens a whole new world of promise. It may make it practical to tap the most remote raw material resources. It may give as much new freedom in the selection of plant sites as the advent of commercial power did to industries tied to their own water wheels.

It would be presumptuous to foretell the character and extent of changes that will be wrought by compounding such strong forces. But — whatever the changes are — it is the builder's job to keep ahead of them.

The industrial plant must encompass in one giant leap the many endless little jumps that reflect technological progress, the variations in process and products, the fluctuations in business, and changing occupancy.

Only as the plant can be easily converted, augmented, expanded, salvaged — or even moved — can it fully satisfy the continuing objective of any private enterprise — operation at a profit.

Turn the page

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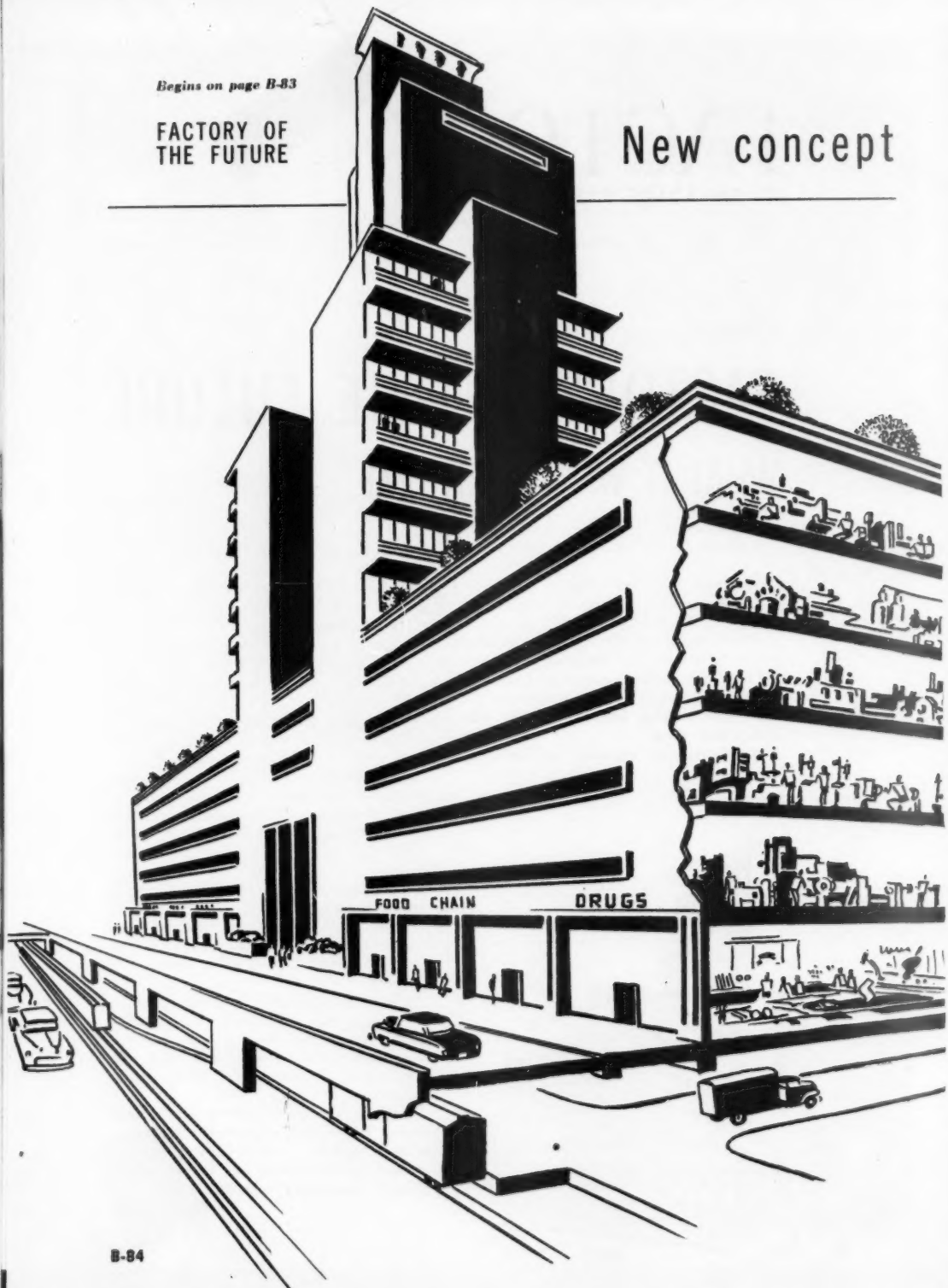
FACTORY OF
THE FUTURE

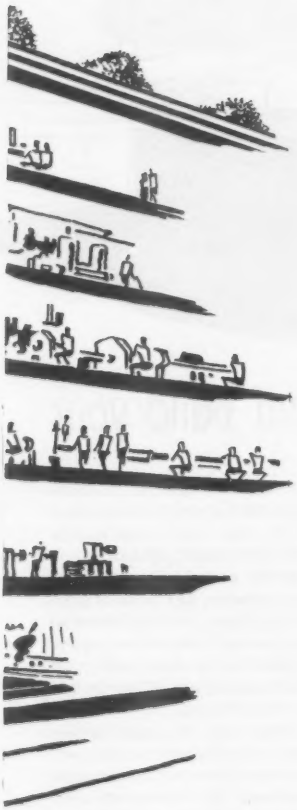
New concept



tiers factories, stores, and homes

The economy and efficiency of the one-story factory, and the necessity to provide parking areas and space for expansion, will continue to lead most companies to new plant sites farther and farther away from built-up urban areas. Efforts to take advantage of the tremendous labor pools and cheap mass transportation of the metropolitan centers, however, may lead to a limited counter-trend. It could even bring the erection of buildings with two to six stories of industrial space and anywhere from 100,000 to 200,000 square feet per floor rising in the very heart of industrial centers now threatened with decay at the core.

Recent developments have greatly enhanced the feasibility of such plants in many communities where all the requisite manpower, materials, markets, and transport facilities are readily available — and where the utility services and other essentials for economical operation are also present.



MULTIPLE-FUNCTION BUILDING — as conceived by The Austin Company's Research Department — has five floors of industrial space for single-story manufacturing operations, stores at street level, and tower apartments or offices.

SINGLE-STORY OPERATING ADVANTAGES · Progress in the field of prestressed concrete, for instance, together with the availability of lighter aggregates, should make it possible to build multi-story plants with 40-, 50-, and 60-ft. spans and generous overhead clearance. Their wide spans and large uninterrupted open areas of floor space would give many light manufacturing industries most of the straight-line operating advantages to be obtained in a single-story building.

By leasing the ground floor space on the principal street frontages to suitable commercial establishments and erecting modern, attractive tower apartments or offices on the roof of the plant, which could be treated as a garden plot, the cost of the land would be spread thin enough to make the combination structure a good investment.

If you had to name this hybrid, it might be called a "unit-tiered vertiplex." By locating the plant entrance on one street and the street lobby serving the apartments on the opposite side of the block—where attractive commercial establishments would complete the principal facade—plant and apartment traffic would be kept separate and apart.

Utility services would be distributed vertically through the central core, which would also contain ventilating shafts. Vibrations and noise would be controlled at the source.

Provision for off-street parking, for manufacturing storage, and for receiving and shipping of raw materials or industrial products by truck or rail could be made in the basement.

Access to and from the manufacturing floors would be provided by ramps at the ends of the building and/or elevators. They would be large enough to carry the largest truck trailers to and from individual depressed docks on each level.

Zoning problems that might be raised by this combination of commercial, residential, and industrial activities in one structure should be easy to resolve in the light of the assistance such projects would give to any urban redevelopment program. Equally important, however, is the effect that such plants would have in restoring the values of livable homes in the accessible areas from which such plants would draw their personnel.

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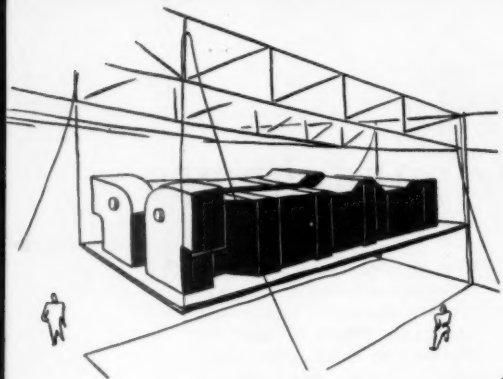
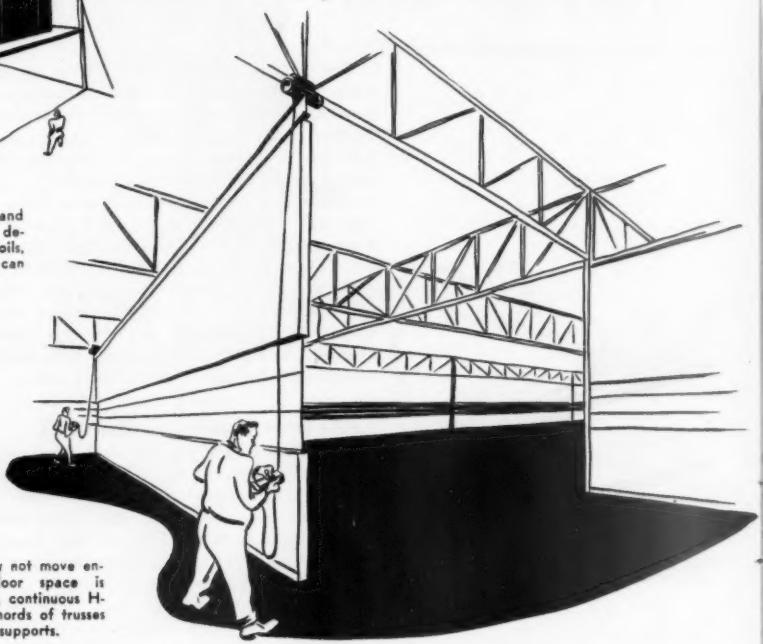


TO SAVE TIME at both building start and finish, standard platform units can be designed with interchangeable fans, coils, filters, and other basic equipment that can be speedily assembled as a unit.



TO EXPAND EASILY, why not move entire wall sections as floor space is increased? In this concept, continuous H-sections used as bottom chords of trusses are employed as monorail supports.

Speed tops "must" list when you build your

While the manifold difficulties presented by manpower and equipment shortages confound every effort to save time in getting a new plant into operation today, speed is perhaps the most important criterion for the period ahead.

Regardless of its long-range usefulness, no plant can start paying for itself until it starts producing. And every day gained at the outset pays multiple dividends. This is particularly true when the difference of a few weeks or a few months means the loss or gain of a competitive advantage—and when the rapid pace of technological change can make a method or a product obsolete before completion of a plant designed for it.

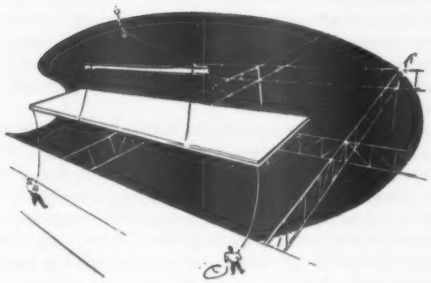
Head start vital · There is no substitute for broad-gaged basic thinking and comprehensive knowledge of the factors that affect location, construction, production, manpower, and costs when you are trying to get a head start on any industrial building project. Recognition of this fact will be responsible for an increasing number of advances in design that enable companies to settle the primary questions of spatial requirements and structural characteristics long before the details of operation and layout have been settled.

"Free-loading" H-section truss · Development of this type of truss, for instance, has made it possible to accommodate shifting loading patterns without special design, so that commitments for the framing can be made before the location of either overhead handling systems or other building equipment has been determined.

Standard platform units · By the same token, the integration of highly flexible ventilating and air conditioning systems into the structural frame, as accomplished on standard platform units with interchangeable fans, coils, filters, and other basic equipment that can be assembled for speedy erection as a unit save time at both start and finish.

Cost-offsetters · While the necessity for more comprehensive and higher-quality building services may tend to increase certain unit costs, this

TO SPEED ROOFING, a mobile unit will spray plastic waterproofing material. It's easily applied, eliminates a good ideal of flashing and cutting and fitting.



TO SPEED CONSTRUCTION, prefabricated roof panels in sizes as large as 10 by 20 feet should soon be available.

factory of the future

tendency should be offset by several factors that will result in a more efficient solution of all building problems.

The availability of more and better basic standard designs and standard factory-built equipment units answering a wide range of operating requirements should reduce the initial investment in two ways. First, it assures better engineering in less time. Second, it takes fuller advantage of the savings to be obtained in large-scale production. A third offsetting economy will be found in the reduced cost of maintenance in plants that have avoided use of materials and equipment that require more than a minimum of maintenance.

All-weather techniques · Gradual elimination of building techniques that cannot be carried forward in extremely cold or wet weather will contribute to the attainment of greater speed. Dry-wall construction, for instance, has already made heavy inroads on the conventional masonry wall. And we have only seen the beginning of this development.

Better materials · The free play of competition between producers of the various metals, plastics, cement, asbestos, glass, and other materials is sure to result in the development of many new designs. The changes that will result from the availability of these materials are not even discernible today. But they will be reflected in the character of the walls and roof structures as well as in the building framework. For instance:

Larger building components · We can be sure that the dimensions of the various building components will grow steadily larger in the interest of increased construction speed, more efficient utilization of the inherent strength of these new materials and greater emphasis on the economies to be obtained by a larger proportion of fabrication in the shop instead of at the site.

Wider column spacing · The call for 40x60-ft. column spacing — which has become so popular in flat-roofed, single-story, steel-frame plants since the war—has already been superseded by a preference for 40x80-ft. spacing. And we can foresee a widespread demand in the heavier industries for buildings with 60x80-ft. column spacing with clearance of 25 to 30 feet. The practice of placing trusses every 20 feet is likely to continue as the most practical means of supporting the various imposed and suspended roof loads, but we can look forward to the development of improved long-span roof decks that will completely eliminate the need for joists, purlins, girts, and other intermediate supports.

Prefab roof panels · The ribbed-steel decking already in widespread use is but a forerunner of completely prefabricated roof panels. They should be available before too long in dimensions of 10x20 feet. They would incorporate any desired acoustical properties as well as required insulation and structural strength.

Lighter concrete aggregates · The work that has been done on lighter concrete aggregates, on prestressing of precast roof slabs, and on the preforming of sandwich-type panels clearly indicates the practicability of some such method of providing immediate shelter just as soon as the framework is in place to support it. Such developments would be directly in line with the faster tempo of work in all phases of future factory construction.

Modular units · While some plants will, as always, be designed around a specific production sequence or process, management will be quicker to see that such facilities are subject to the same kind of accelerated obsolescence as the special tooling for a new-model automobile or airplane. This fact will be reflected in increased use of standard equipment and demountable modular units which facilitate the rearrangement of major building elements as well as service and production equipment, when necessary.

Turn the page

IN THE FACTORY OF THE FUTURE . . .

. . . you'll have to pay even more attention than . . . handling

Management now realizes that savings from mere mechanization of handling operations are small by comparison with those resulting from a comprehensive analysis of all the problems encountered in receiving, storing, and processing of materials, and in moving them around. This knowledge is bound to influence future factory design.

Point-of-use storage · Instead of concentrating attention on the adequacy of storage space for raw materials at the receiving point and for finished products adjacent to the shipping platform, companies will give more thought to the economies of storing materials and work-in-process adjacent to the point of next use.

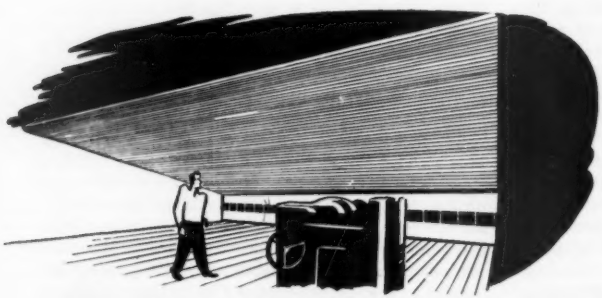
Greater flexibility · The unlimited flexibility provided by the fork lift truck for moving all types of floor loads vertically as well as horizontally has already been matched by comparable overhead facilities in a number of plants, where interconnecting monorail systems serve all sections of the building. While engineering studies will determine choice of equipment, the greater integration of overhead handling supports with the structural framework of a building will tend to simplify installations overhead. Where continuous H-sections are used in the bottom chord of trusses, for instance, they may be employed as monorail supports. As such they can be utilized to move entire wall sections as floor space is increased.

Mobile overhead storage · The principles of mobile overhead storage so widely used for handling in-process materials in automotive and appliance industries can be expected to find their way into any new industries requiring the assembly of rellatively bulky and highly finished parts. Conceivably, such systems will be equipped with electronic controls which would automatically release the appropriate parts to each work station, where the actual assembly function may even be set in motion as the successive elements of the assembly drop into place.

Installation of any such overhead systems, which can be most effectively handled in the space between the roof and the level at which lighting fixtures are installed, will be greatly simplified if the area between roof trusses or other supports is kept clear of obstructions and sufficient height is provided to permit easy passage through the supporting members.

Electronic control · Although the prospect of trackless, fixed-path conveyor systems, both overhead and on the floor, is considerably more remote, the further development of electronic circuits may make it entirely practical to move materials from station to station without any visible force. When that day comes, industries that today rely on drag-chain systems in the floor and overhead-trolley conveyors will be able quickly and simply to accommodate any changes that develop.

Begins on page B-83



CEILING MATERIAL ITSELF may soon become a source of illumination. Either electricity or ultrasonics can cause some building materials to give off light.

. . . lighting

Starting with illumination entirely from point sources (incandescent) and progressing to the more diffused line and strip sources (mercury vapor and fluorescent), equipment manufacturers and lighting engineers have been drawing ever nearer to the ultimate of over-all surface lighting comparable to the sky.

Ceiling as source · Systems using "egg crates" and continuous plastic ceilings placed below fluorescent light sources (now found in many offices and commercial

you do now—to . . .

. . . the human side

Enlightened self-interest will lead to the adoption of many building refinements that increase efficiency, reduce maintenance, and improve working conditions. Wider and better-informed functional use of color for the sake of economical maintenance, accident prevention, greater productivity, and quality control, for instance, will automatically reduce monotony and eye fatigue. Reduction in the noise level—by acoustical treatment as well as isolation at the source—will serve the same objectives.

Dust control · The widespread interest in a recent symposium on the broad subject of "the industrial atmosphere" (conducted by the American Society of Heating & Ventilating Engineers) clearly indicates that management is moving toward wider adoption of controls for the improvement of working conditions and for over-all efficiency, even where they are not required for the process.

Well-kept grounds · More and more companies are discovering that beauty and efficiency go hand in hand. Well-kept lawns and landscaping, together with paved parking areas, for instance, keep down dust that would otherwise require filters at air intakes. Where cleanliness is of primary importance, and snow a problem, walks are being equipped with special steam coils and drainage. Canopies provide additional protection as employees approach the entrances at ground level, just as drive-in unloading platforms do in those with fully protected entry corridors.

Weather-protected passages · Where the size, shape, or traffic conditions at the plant and distribution of plant entrances make it necessary for large numbers of employees to park at some distance from a building, we may see tunnels, ramps, or some other form of weather-protected passages extending out into the area from distribution corridors within the plant.

Photo-murals · Employees may acquire a greater understanding of their individual roles in the industrial complex as new plants provide built-in features that perform communication functions. Life-size pictorial flow diagrams or photo-murals telling the story of production would personalize every step in the manufacturing sequence and at the same time give everyone a clearer understanding of his individual place in the scheme of things in the plant.

Television · By the same token, closed-circuit television could be utilized for indoctrination, supervisory training, entertainment, and special morale-building functions.

Recreation · There will be sound dollars-and-cents reasoning behind any special provisions made for the express convenience, comfort, and recreation of employees. While many plants moving to large-acreage plots in outlying sections may encourage outdoor activities during the noonday break or after working hours, at no real cost to themselves, any such activities are bound to enhance their job appeal. Similar opportunities will present themselves in many other plants where floor space initially provided for expansion or underground space designed for bomb protection could be employed for the asking.

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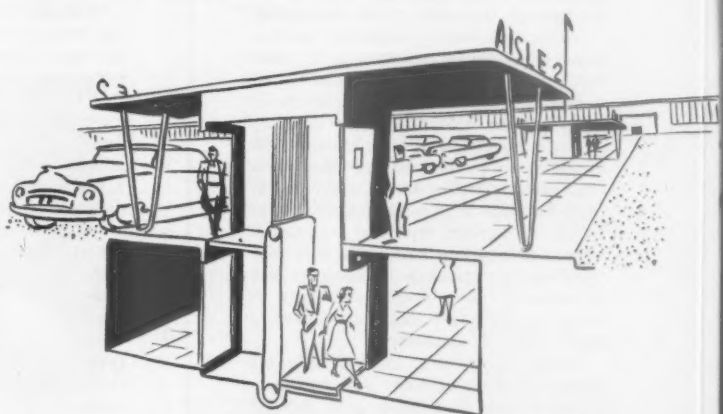
buildings) are too costly for the average industrial building. But they are probably the forerunners of some system by which the ceiling itself will become the source.

This could be accomplished by using materials that can be electrically or ultrasonically excited to provide any desired intensity of light across the entire surface of the ceiling—and in some cases even the upper wall areas. The ability to control the degree of illumination in any given area by merely regulating the over-all intensity would maintain shadowless quality, with out regard for quantitative changes.



CONTINUOUS ELEVATORS along tunnels beneath parking lots or across street may speed safe entry and exit of employees.

BUILDING MATERIALS OF THE FUTURE

By ALBERT G. H. DIETZ
Professor of Structural Engineering
Massachusetts Institute of Technology, Cambridge

SAVING OF TIME AND LABOR AT THE SITE by means of quickly assembled units is the principal trend in building today. Field labor and the carrying charges on construction are both expensive, so anything that reduces these costs is likely to result in an over-all saving. This factor underlies many of the current developments in building materials and building techniques. Coupled with it is the search for materials requiring minimum maintenance.

No immediate and startling revolutions in building materials and practices are indicated. But steady advances and developments are taking place, especially in industrial plant building because the designers have always been quick to adopt any new developments that promise better and cheaper buildings. The size of the building industry, however, together with the restraining effects of building codes and the time involved in training building trades workers in new techniques, tends to make progress in building *evolutionary* rather than *revolutionary*.

In this survey only some of the most promising developments can be mentioned—those that have gone beyond the experimental laboratory and show real promise for the immediate future.

R. M. HOLLINGSHEAD CORP.

VINYL PLASTIC COCOON, used to mothball battleships, is watertight, can be spray-applied around parapets and skylights.

PLASTICS

Some plastics or synthetic resins are used as such, but many are combined with other materials. Only a few of the most promising building developments can be mentioned here.

Fiber-reinforced plastics · The polyester plastics can easily be formed into large complex shapes in simple inexpensive molds. When the polyesters are reinforced, particularly with glass fibers, they provide strong, durable, highly translucent to opaque materials. Although first developed for items like boat hulls and aircraft components, they are now used in buildings as corrugated and flat sheets easily installed with standard corrugated and flat structural sheet. They are being tried for pipe, conduit, conductors, and many specialties where a lightweight, tough, non-corroding material is required.

(For examples of the use of glass-fiber reinforced materials, see page B-112.)

Transparent and translucent sheets and shapes · The transparent plastics, particularly the acrylics, are finding their way into building. They are more expensive and less scratch-resistant than glass. But they have the advantages of greater toughness and formability that lead to their use for windows and lighting fixtures where shatter resistance is important. One successful combination of transparency and formability is found in the recently developed bubble-shaped skylights.

Coatings · The sprayed-on vinyl plastic cocoon materials of the Navy's mothball fleet are being tried for coatings and roofing, and for waterproofing masonry and concrete. They are easily applied around parapets, skylights, and other difficult projections on a roof, eliminating a good deal of flashing and cutting and fitting. They can be readily sprayed over masonry and concrete walls. Their flexibility allows them to accommodate themselves to changes in dimension caused by temperature,

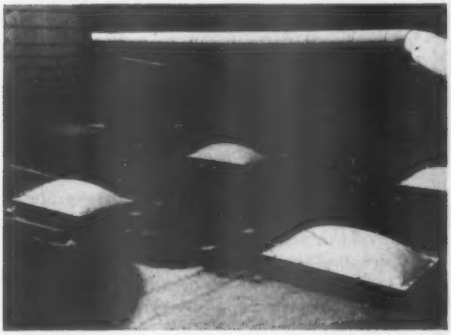
WURDACK CHEMICAL CO.

SILICONE MASONRY SPRAY prevents efflorescence, minimizes stains, and keeps water out. You can wash the surface.

shrinkage, fine cracks, and other causes. Their toughness makes them attractive for interior surfaces. For roofing, the vinyl plastics combined with rubbery and bituminous materials seem to promise maximum durability and minimum maintenance.

Silicones and fluorocarbons · Although still expensive, these materials are of particular interest where inertness and durability under extreme conditions are required. The silicones, for example, provide coatings resistant to temperatures higher than can be withstood by other synthetic resins. Ultraviolet light, steam, most corrosive materials, and ozone have little or no effect. The same holds true of the fluorocarbons, which are particularly useful for handling highly corrosive materials.

Both have outstanding electrical characteristics. Both are highly water-repellent and the silicones are already being used to treat masonry surfaces. Silicone rubbers retain their flexibility at very low temperatures, are unaffected by temperatures high enough to cause rapid breakdown of ordinary rubbers. Neither class of materials is particularly abrasion-resistant.



WASCO FLASHING CO.

BUBBLE-SHAPED SKYLIGHTS of acrylic plastic are shatter-resistant, self-cleaning. Here they replaced wood and glass.

PRESTRESSED CONCRETE

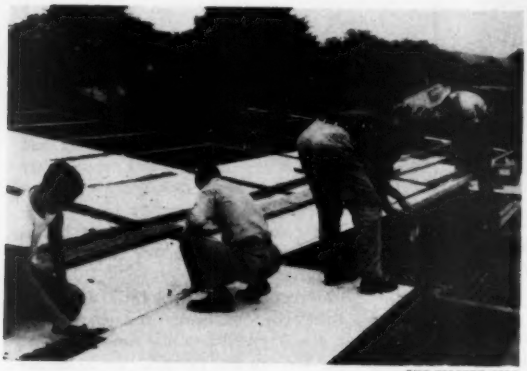
Although apparently first used in the United States many years ago, prestressed concrete for buildings has had its greatest development in Europe. Only recently has it been introduced into current American practice. It is still undergoing considerable development but appears to be headed for much more widespread use.

Prestressing means the intial stressing of reinforced concrete in such a way that these stresses must be overcome before the normal stresses due to building loads can be set up. Therefore larger load can be carried than would normally be possible. This leads to smaller members such as beams and slabs, requiring less material than usual. Concrete may be reduced by as much as 50% and steel by 75%. High-strength steel wire and cable and high-strength concrete are advantageously employed. Because the concrete is under compression, cracking under load is to a considerable extent eliminated, and greater durability under severe exposure conditions is obtained.

Prestressing has been popular in Europe because of the savings in materials, but a large amount of labor has been necessary. In the United States labor is expensive compared with materials. Therefore the full advantages of prestressing will not be realized until ways are found to reduce labor costs. Precasting of prestressed members is one way of reducing labor costs, but precasting makes it difficult to obtain the engineering advantages of continuous frames, in which columns, beams, and slabs are all integrally combined. The ultimate answer will probably lie in a combination of precasting and casting in place.

(For an example of the most advanced industrial use of prestressed concrete, turn to page B-94.)

Turn the page



THE CELOTEX CORP.

FUNCTIONAL ROOF DECK, wall, and partition materials combine structural strength, insulation, and a maintenance-free surface.

ALLEGHENY LUDLUM STEEL CO.

STAINLESS STEEL CURTAIN WALLS for exteriors save weight, space, erection time; require little maintenance.

OWENS-ILLINOIS GLASS CO.

SANDWICH PANELS (these have calcium-silicate cores and cement-asbestos faces) are easily put up. Metal spline fits into groove at panel joint.

SANDWICHES

Two principal functions of a building wall —weather tightness and insulation—can seldom be performed efficiently by one material. Consequently it is logical to combine two or more materials into a sandwich. The facings provide the strong weather- and abrasion-resistant surfaces. The cores provide the insulation. And the combination provides stiffness and rigidity.

Many sandwiches are under active development. Some of the combinations:

Facings—porcelain-enameled steel, aluminum, stainless steel, cement-asbestos board, reinforced concrete, plywood, hardboard.

Cores—cellular glass, foamed concrete, cellular burnt clay; fiberboards, plywood, wood waste boards; finely porous silicates; grids, including honeycomb and crossed corrugated paper.

Sandwiches made up of cement-asbestos board facings with fiberboard or silicate cores are already familiar. Others, such as the resin-impregnated Kraft paper cores with metal facings, and the cellular glass cores faced with thin slabs of concrete, are coming into more widespread use. Concrete facings lend themselves to prestressing because they are best made in a shop. The standardized sizes usually possible allow for a mechanized set-up in contrast to the large amount of hand labor often involved in field prestressing.

All sandwiches lend themselves to shop fabrication in the form of panels to be transported to the site and assembled with a minimum of labor and time. They therefore conform to the trend toward minimum site operations.

A problem common to all sandwich panel construction is the simple, reliable sealing of joints. The sealant—a mastic, gasket, or calking compound—must be flexible to allow for dimensional changes during the life of the building. It must adapt itself to the necessary construction tolerances. And it should have a long useful life—preferably equal to the panels themselves—to avoid excessive maintenance. With the increasing use of panelized construction, the need for improved sealants becomes greater, and much can still be done in this direction.

(*For examples of sandwich-wall construction, see pages B-96, B-102, and B-114.*)

GEORGIA-PACIFIC PLYWOOD & LUMBER CO.

CONCRETE FORMS of faced plywood were used for 40 pours on this construction job, saved the builder $150,000.

WOOD

Principal developments are in glued-wood construction and in wood-based sheets and boards.

Glued-laminated wood · Arches and similar structural members of this material will probably be increasingly important, particularly if structural steel continues in short supply. Resin glues make these members highly moisture-resistant. Pressure-treatment of the thin laminations before gluing can make them resistant to decay and fire. Developments in rapid continuous-glueline curing by radio frequency fields may make standardized bent-arch members readily available as standard items. The cost position of glued-laminated wood relative to steel and concrete will decide its future.

(For an example of glued-laminated timber construction, see page B-94.)

Faced plywoods · Plywood faced with resin-impregnated paper or with hardboard is undergoing rapid development. As the supply of high-grade peeler logs dwindles, and more imperfect veneers must be used, these faced plywoods should find increasing use. Furthermore, for many purposes the combination of strength and toughness provided by the plywood core with the smoothness, uniformity, and general resistance of the facing gives a product superior for many purposes to either constituent by itself.

Wood-waste boards · Synthetic resins provide the means by which wood waste such as shavings and some sawdust can be bonded together in the form of wood-waste boards. Developments here, slow at first, are now coming along at an accelerating pace.

METALS

With the possible exception of titanium, no radically new innovations in metals and alloys appear to be in the offing. But existing metals, especially aluminum and steel, will probably find expanding use.

Aluminum and steel (the one, plain or anodized; the other, stainless or enameled) are already in use for the facings of buildings. And they will undoubtedly find increasing use because of their weather tightness and low maintenance costs.

Magnesium is a question mark. Its corrosion resistance is poorer than that of aluminum, for example, and its light weight is not necessarily a great advantage in building.

Titanium is easily the most intriguing development among the metals. Its strength and toughness match those of steel. Its corrosion resistance is outstanding. Its weight lies about halfway between steel and aluminum. It is one of the four most plentiful metals in the earth's crust.

The great difficulty with titanium lies in its extraction from its ores, to which it clings with great tenancity. Present refining methods are expensive and small in scale. The present price of approximately $10 per pound is prohibitive, but large sums are being spent in an effort to bring costs down. Research in this field is intensive. Some approaches, still very much in the laboratory stage, look promising. Whether the price of titanium will drop far enough with the next five to ten years to be attractive for buildings remains to be seen.

MASONRY MATERIALS

Structural burnt-clay units, such as brick and tile, are still of great importance in the industrial building field.

They will continue to be. But their relative position in their present form is declining because of cost, weight, and bulk. Producers have begun research programs designed to find better ways to utilize this basically plentiful and durable material. Lighter weight and larger units, possibly incorporating cellular or foamed cores with dense faces, may well be the result of this research work undertaken by the industry.

Experimental work is also under way to see if thin load-bearing walls using 4 inches of brick combined with poured concrete studs can be made feasible, either as job-built or prepanelized units.

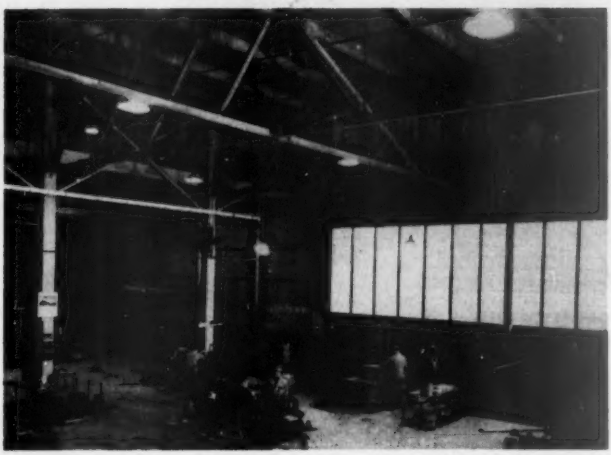
FOUR TREND-SETTERS IN

1 GLUED LAMINATED TIMBERS

NAME: Grinnell Company of Oregon
LOCATION: Portland, Ore.

PRODUCT: Piping supplies, fire protection systems
EMPLOYEES: 45

ARCHITECT: Richard Sundeleaf, Portland
ENGINEER: Cooper and Rose, Portland
BUILDER: The Henry M. Mason Company, Portland, Ore.



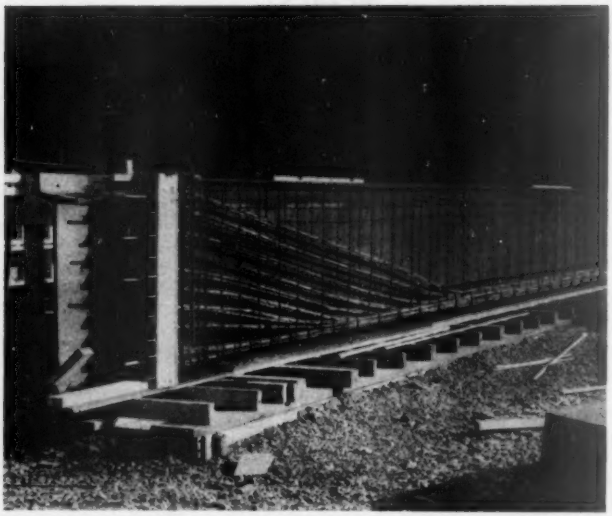
WELL-SPACED INTERIOR of Grinnell plant gets wide (60-ft.) column spacing with glued-laminated timber trusses. Light-weight timber replaced structural steel, also cut erection time and costs. The laminated trusses require no maintenance.

2 PRESTRESSED CONCRETE BEAMS

NAME: The F. W. Wakefield Brass Company
LOCATION: Vermilion, Ohio

PRODUCT: Lighting equipment
EMPLOYEES: 25-40

ENGINEER & BUILDER: The Austin Company, Cleveland



PRESTRESSED CONCRETE BEAMS were poured in forms at one end of the site of Wakefield plant. Form above (with one side off) shows position of the 10 double cables of ¼-in. high-strength wire and the ¼-in. reinforcing stirrups.

PLANT BUILDING METHODS

WELL-STYLED EXTERIOR blends face brick, concrete block, continuous sash, and corrugated cement-asbestos board. A striking effect, yet all materials are both functional and economical.

FOR THE SHORT RUN the Grinnell people saw in timber construction an economical way to build their new West-Coast plant, and an easy way to get building materials fast. But over the long haul they also wanted a serviceable building—one that would stand the gaff with a minimum of maintenance. They achieved both these ends by using glued-laminated timber trusses on structural steel columns.

WHY NOT SAWN TIMBER? For two reasons. One, the laminate is 20% stronger. That meant lighter members and longer spans—up to 60 feet in some sections of the plant. More important, glued laminate is kiln-dried. It's fully seasoned before erection. Glued laminate won't easily warp or crack. And there's no need for the periodic checking and tightening of bolts commonly required during the aging-in period of sawn timbers.

The Grinnell plant houses 43,000 square feet of pipe fabrication, warehousing, and office space. Factory fabrication of the timber trusses cut erection time and costs.

STRESSING CABLES after concrete has set, puts wires under 145,000 psi. tension. Concrete is then in compression, withstands heavy loads. Beams cut structural steel needs by two-thirds.

PRESTRESSED CONCRETE BEAMS saved time and materials in the Wakefield plant. Time, because structural steel was not immediately available. Materials, because the beams use less than a third of the steel needed for ordinary steel framing. And smaller beams carry heavier loads because the concrete is in compression.

THE TECHNIQUE · It's not new, but the application to plants is. And these 60-ft. beams are the longest yet made in this country for buildings.

The technique consists of running 60 strands of high-strength ¼-in. steel wire through the form in ten double cables of three strands each. Beams also contain ⅜-in. mild steel rods in top and bottom flanges. The concrete is high-strength (5000- to 7000-lb.) It contains a high percentage of cement and carefully graded aggregates, and is vibrated to get maximum density.

About a week after the concrete is set, the wire cables are stressed to 145,000 psi., and clamped. A 60-ton hydraulic jack does the job. Beams are then ready for use.

Columns and struts in the Wakefield building are reinforced concrete. Rods projecting from each of the members are welded together to make an integral steel frame, and covered with concrete.

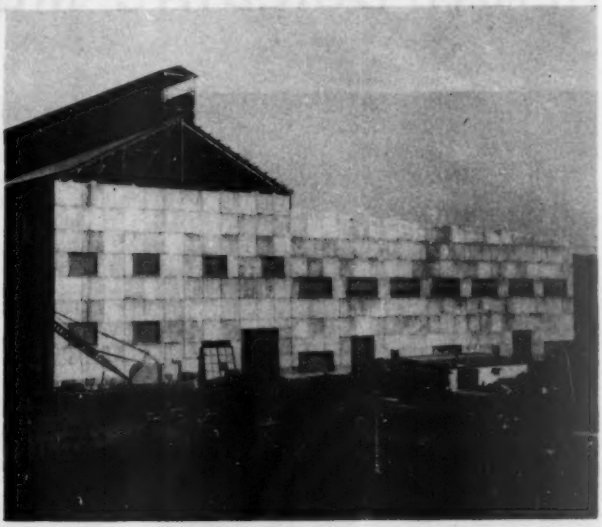
Turn the page

3 PRECAST SANDWICH WALLS

NAME: Electro Metallurgical Company, Division of Union Carbide & Carbon Corporation
LOCATION: Marietta, Ohio

PRODUCT: Ferro-alloys
EMPLOYEES: 500 (eventually 2500)

ARCHITECT & ENGINEER: Ford, Bacon & Davis, Inc., New York
BUILDERS: Marietta Concrete Corporation, Marietta, Ohio; Cemenstone Corporation, Pittsburgh



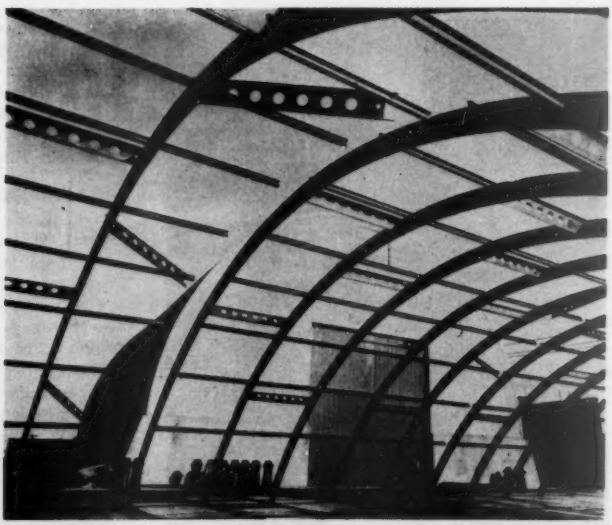
SANDWICH PANELS of insulating material held between precast concrete slabs were used for the walls of the new Electromet plant. Panels have the advantage of lower cost, better insulating qualities than brick. They're good-looking, too.

4 LONG-SPAN MULTIPLE-ARCH CONSTRUCTION

NAME: A. O. Smith Corporation
LOCATION: Milwaukee

PRODUCT: Truck frames
EMPLOYEES: 56

ARCHITECT & ENGINEER: Stran-Steel Division, Great Lakes Steel Corporation, Detroit
BUILDER: Shoreline Supply, Inc., Holes Corners, Wis.



SPEEDY ERECTION OF ARCHES cut construction costs and time. Roof sections, pre-assembled on ground, are raised into place on top of straight sidewall framing. Corrugated siding and translucent strips for daylighting are speedily nailed to frame.

PANELS, brought to site by truck, are 5 inches thick, measure 8x8 and 8x10 feet, to match sash. Tongue-and-groove edges are sealed by band of concrete. Inserts for handling are cast in.

ANOTHER MODERN MATERIAL — and it looks modern —is the precast concrete sandwich panel. Such panels were chosen for the Electromet buildings because they cost a third less, provide better insulation than brick. A bonus advantage is the architectural beauty of the panels.

SANDWICH TECHNIQUE · The Electromet sandwich is a three-layer job made up of two slabs of 1¾-in. high-strength reinforced concrete with a filling of 1½ inches of insulation, totaling 5 inches. Edges are sealed by a continuous band of concrete that forms a tongue and groove. Panels measure 8x8 and 8x10 feet, with a tolerance of only 1/16 inch on dimensions and warping.

Inner face has a smooth but not slick finish. It cuts glare, makes a good surface for paint.

Four kinds of insulation were used. Two are precast concrete with a wood-chip aggregate; two use glass. Coefficient of heat transfer ranges from 0.14 to 0.33, compared to brick's 0.36.

U-bars for handling by crane and threaded inserts for erection are cast in each panel.

Cost of the walls of the Marietta buildings ranges from $2.13 to $2.46 per square foot, compared to $3.50 for 12-in. brick.

LONG SPAN OF ARCHES gives new A. O. Smith building a relatively unobstructed plant floor. Multiple 40x35½-ft. column spacing suits this Quonset building to manufacturing needs.

IT'S NOT THE METHODS or materials in A. O. Smith's new Quonset building that are new. It's the column dimensions. Multiple-arch Quonsets have been used before for special-purpose plant buildings. But column spacing has been restrictively narrow.

This new Quonset is designed to meet general manufacturing needs. It has a column spacing of 40x35½ feet, close to twice that of previous multiple-arch Quonsets. That means a prefabricated building with plenty of elbow room for handling equipment and layout of heavy machinery.

OTHER ADVANTAGES · A. O. Smith also gets the standard advantages that go with Quonset construction. One is fast erection. All materials are factory-fabricated, pre-punched, and shipped ready for erection. Then, too, all siding and insulation — both interior and exterior — are speedily nailed to the special steel framing. Construction time from start of foundation to finished building was 3120 man-hours.

Standard Quonset truss clearance is 15 feet. Smith wanted a clear height of 20 feet, so set up its Quonset on a 5-ft. reinforced block wall. And should Smith want to grow, it can expand in two ways—by extending the two existing bays or by adding arches.

HOW PLANT SERVICES will match tomorrow's needs . . .

By J. W. ST. ANDRE, Electrical Editor, and C. G. WYDER, Maintenance Editor

Plant services will be "packaged" in your factory of the future

If unit substations are a *must* in the distribution of electric power, why not unitize steam, air, heat?

Why long lines of steam piping that must be kept heated in order to supply small amounts of process steam at the far end of the plant? They mean big heat losses even with the best insulation.

Why air lines that must be kept filled at all times? Not only do you have trouble with water condensate in the air lines, but how about the many air leaks that are always present in large grid systems? It takes a lot of electric power to supply all those leaks and still keep the pressure up to the desired level.

PACKAGED UNITS . You will find small packaged boilers already on the market. And they are getting better all the time. Fully automatic in operation and with all possible safeguards, these boilers may be spotted around the plant, each supplying certain areas or processes.

Small air compressors will supply the air requirements in the same areas and processes. Heating can be taken care of with small heating units, either gas- or oil-fired. It is possible to shut down units for maintenance without affecting the heating pattern for the whole building.

Unitized heating, steam, air, and electric power will enable you to plan plant services around modules. The ever-changing production plans in the factory of the future make it necessary to have a very flexible distribution system of these services. For instance, if a certain process that needs high-pressure steam is moved to the other end of the plant or to another building.

You'll install service equipment outdoors and up on the roof

But let's say you generate your own power, or need gobs of steam. You have to have that central steam plant. All right. But why build a monument?

Many power plants are now being put up right out in the open with very little building enclosure. Boilers, turbines, generators, and switchgear are just as much at home out in the open as in huge structures of steel, concrete, and brick. It may cost you a little extra for the equipment, but the building costs you a pretty penny also.

SUBSTATIONS ON THE ROOF . Without a doubt you'll be using unit substations. Why not put them on the roof where they won't be occupying much-needed manufacturing floor space? Get your big pieces of switchgear and motor starters up on the roof also. Switchgear designed for open-air installation is now available. It's weatherproof. It will be out of the way. Unauthorized people will not be able to tamper with it. You may expect to pay more for these weatherproof enclosures. But floor space for your production is very valuable, too. Ask your production manager.

Electrical distribution systems will be simpler and more flexible

The trend is towards simpler distribution systems within the plant itself. You don't buy two furnaces and keep both on the line just in case one should get into trouble, do you? By the same token, why provide your whole distribution system with duplicate services when you only need certain operations on firm power?

These operations could be fed from two separate substations in the plant. Automatic throw-over switches would cut power from one source to another in case the first feed had an outage caused by its own substation. Network systems tie up a lot of money in oversize transformers. Switchgear also has to be larger if you are to have sufficient short-circuit protection. Of course, if you can afford it, dual incoming power sources plus network systems inside the plant will give you the utmost protection against outages.

TIE-BREAKERS . Using the simpler radial system, don't forget to provide tie-breakers so that your maintenance electricians can do maintenance work on the system and still keep power on during light load periods. There always seems to be a little pump that must be kept on the line at all times when you plan a power shutdown. Tie-breakers will avoid having to schedule those complete power shutdowns to do necessary repairs and overhauling of substations.

SWITCHGEAR • Watch out for the size of switchgear that you put into your new plant. This is especially true for your incoming substation. The danger will come from without and not from within your plant.

As more and more power is demanded by industry, the power companies must establish huge systems for delivering those amounts of power. These systems have this danger: If a fault occurs anywhere on the connected load, the systems are capable of delivering tremendous amounts of power into the fault.

Switchgear on the customer's property must be capable of handling this power when trying to open under fault conditions, or things will go boom. So interrupting capacity of switchgear and circuit breakers will become more and more important in the future.

And you can't sit back after you have bought that new gear and go to sleep. Conditions are continually changing on the power company's systems. Your new switchgear may be inadequate in short order unless you anticipated these changes when you were buying the new gear. You must consult the power company when you put up that new substation if you want to avoid this trouble in the future.

Furnace power at 460 volts is in the cards. Large furnace installations of 2000 kw. have made the old conventional 230-volt systems inadequate. Design of elements that will operate on 460 volts for the large furnaces will be available for smaller furnaces using only 1000 kw.

RECTIFIERS • "Give us a source of adjustable speed that is fairly cheap for our automatic machines," cry the machine designers.

They are, of course, referring to the many advantages of the old reliable d-c motor. It is a curious fact that after more than 100 years the d-c motor still offers certain operating features that cannot be found in any other motor.

The main drawback is to get power to operate this type of motor. So-called packaged drives are available that convert a-c power to d-c with motor generators and then in turn control the d-c motor.

The d-c motor load in your factory of the future may warrant some sort of d-c distribution system. For power you will use rectifiers to change the a-c to d-c.

For large amounts of power, mercury-pool, ignitron-tube, and mechanical-type rectifiers can be used.

Smaller amounts of power, especially for isolated machines, will be supplied by the metal-plate rectifiers. These rectifiers that use copper oxide or selenium stacks are compact, have no moving parts, require no water supply for cooling, and are obtainable in all sizes and shapes. Their use includes power supplies for plating at low voltages and high current to 250-volt power supply for motors and controls.

Welding is also a field where the use of rectifiers is increasing.

GERMANIUM RECTIFIERS • A new source of rectification is showing great possibilities for the future. Germanium, one of the rare metals, dates back to 1886. But it wasn't until a few years ago that it really became a "hot" item.

Physically, these new rectifiers occupy approximately 10 cubic inches per kw. of output capacity compared to 350 cubic inches per kw. for selenium. Current densities of over 300 amperes have been rectified, and there is no reason why the new stacks of germanium will not handle currents up to 1000 amperes. This is heavy power in small packages.

Germanium may therefore be the answer to the problem of low cost and small size in obtaining the source of d-c power that everyone is looking for. Its use in the plant of the future may well revolutionize automatic machine drives, especially where it pertains to flexibility in speeds.

Electrical wiring will be lighter, won't need separate conduit

Aluminum for use in electrical wiring is growing by leaps and bounds. Not merely as a substitute for copper, which is hard to get at present. Aluminum offers many advantages—especially that of weight reduction. This advantage reflects itself throughout the whole installation. Supports can be lighter. The installation electricians can handle the wiring much easier.

The problem of connections offers a challenge to the designers. Some of the problems have been met. However, a little more care must be exercised in making up electrical connections on aluminum to prevent heating and poor contact.

Aluminum bus bars in bus duct would be advantageous. Handling the weight of bus that carries high currents is a job in the field. The lighter-weight aluminum would represent a saving not only in the duct itself but also in the supports. And it would put less of a load on the supporting beams in buildings.

NEW SYSTEM • There is a new self-contained wiring system on the market. The conductors are spaced and insulated by a non-combustible mineral insulation in a flexible seamless metallic tube. It forms its own conduit.

The mineral insulation is completely non-combustible and can stand external heat or flame up to the melting point of the metal used for the sheath. It is moisture-resistant. It also resists oil, gasoline, and solvents. All components in its construction are stable. They are not affected by heat, sunlight, and ozone conditions that are detrimental to conventional cables. The cable is thus as permanent as the structure in which it is installed.

This new wiring is especially useful in boiler rooms where heat is so detrimental to conventional wire. It's a "natural" for hot, damp locations like ashpits, steam tunnels, and areas adjacent to high-pressure steam lines. On machine tools where oil and cutting lubricants abound, the new wiring will fit the contours of the machines and make for a neat installation.

Turn the page

Firm power will be a must— so you'll need two sources of supply

Some of your operations will require firm power. To be sure you're going to get it, the place to put your money is on the incoming power supply. You almost never have a transformer failure in your plant. You often have power interruptions due to the power company's failure to deliver.

The power company has a real problem keeping you supplied with electricity. Miles of transmission lines exposed to ice and storms. Poles, switchgear, circuit breakers and substations, cable failures, errors in switching—all contribute to sources of possible trouble that may interrupt the flow of power into your plant. If you don't receive any power, all the fancy networks and distribution systems inside the plant will not keep your machines going.

DUAL SUPPLY . Make sure the power company gives you power from two distinct sources, not two feeders tied into the same section back in its substation. You would be surprised at the dual feeds that are not so dual when you get to the power company's system.

"Lots of light" won't be good enough lighting for your factory of the future

Lighting in the factory of the future will not only be of higher intensity; it will also take employee comfort into consideration. Raising light levels to 100 foot-candles without taking into consideration visual tasks, brightness factors, light surroundings, or distribution of light may do more harm than good. Just pouring a lot of light into an area doesn't mean you will get good lighting.

FLUORESCENT LAMPS . Best bet for your plant of the future will be the new fluorescent-mercury lamp. It gives you the large amount of light per lamp without the objectionable color of mercury-vapor lamps. People just don't like to work under mercury lamps. Using high-wattage incandescent lamps along with the mercury helps to reduce this objection somewhat. But that means two fixtures for each light source. Now you can get both in the same lamp.

More use will be made of the so-called deluxe fluorescent lamps. These lamps are useful where better color discrimination is needed. Inspection of textiles, baked goods, color proofs, and similar color products is more effective under these lamps. They are also complimentary to complexions; they make the girls look better than ever.

Luminaires will take eye comfort into consideration. No bare lamps will be visible to the workers. Some of the light will be directed upwards towards the ceiling and upper walls to reduce brightness contrasts.

SUPPLEMENTARY LIGHTING . It will be used to light up specific visual tasks. Automatic machines will require special light to illuminate working areas out of reach of general room lighting. Inspection of processes will call for unusual lighting equipment made especially for the given task.

Black light or ultraviolet light used on compounds that glow when irradiated will show defects in materials. Polarized light makes possible the detection of strains in transparent objects. Detection of these strains will avoid failure of equipment in the field.

GERMICIDAL LAMPS . Your operating group will be healthier—because you'll be using more germicidal lamps in your factory of the future. These lamps will kill 95% or more of the germs in the air above eye level. That means less absenteeism due to colds.

For manufacturers of foods, pharmaceuticals, and drinks, germicidal lamps will reduce spoilage and losses by retarding the development of harmful bacteria and molds. From penicillin to pork, from bandages to beef, germicidal lamps will be a potent weapon against contamination.

OZONE LAMPS . There will be no excuse for bad odors from processes in your plant. Lamps that produce ozone may be combined with non-ozone types for the destruction of odors built up from the continual re-use of air from occupied areas. Derived only from air, ozone oxidizes odors, leaves no unpleasant residual chemical odors.

LESS FATIGUE . Lighting will be so controlled in the future that its intensity can be adjusted during the day to coincide with employees' fatigue curves. As the workers tire during the day, lighting will be increased to give them a lift in morale.

BETTER MAINTENANCE . Greater lighting will mean much more attention to the maintenance of lighting systems. As you depend more on lighting as a production tool, any decrease in its efficiency will result in lower productive output. Your electrical maintenance department will have to study and adopt the best and most efficient way of cleaning and relamping if your lighting costs are to remain at a low level.

Here are things you won't see in the factory of the future . . .

. . . OILERS RUNNING AROUND . In the factory of the future, lubrication will be a utility service just like water, steam, and electricity, rather than a manual maintenance operation. You won't see oilers

running around with oil cans or pushing lubrition carts from machine to machine. Instead, lubricants will be pumped through pipes to each machine from a central source. And measuring units on the machines will feed the lubricant to each bearing in the right amount and at the right time by time clock control. You won't have to stop machines to lubricate them.

Sounds fantastic? Then take a look at Hanna Coal Company's new coal preparation plant at Georgetown, Ohio. All machinery is automatically lubricated from three central pumping stations, time-clock controlled. These systems require 18,000 feet of underfloor supply lines and 14,000 feet of copper feed lines. The supply lines for this automatic system were designed right into the plant before it was built.

So was the control panel for each system, which makes chart records of lube pressure and time cycles. These panels were made a part of the master operations control panel, to show the performance of the entire lubrication system. A flashing red light warns the observer if a failure occurs.

Prime purpose of the system was to minimize downtime for lubrication and repairs. Other goals were safer lubrication, and reduction of maintenance and lubrication costs. In the first 8 months the system has saved over $32,000 in labor, cut cost of lubricants 45%, without a single bearing failure.

... POLLUTED STREAMS · Your plant will have to do somethig about waste disposal. You will not be able to dump your waste products in the near-by river and get away with it, as in the past. The public is aroused and demanding action from city fathers about water pollution. Better include a waste disposal system among the plans for the new plant.

... STICKY WEATHER · Air conditioning will be a must for processing. Clean air at the proper temperature and humidity will have to be supplied to many operations. Precision tolerances in machining will demand that temperature be taken into consideration. Moisture in the air will ruin many a process and material.

... WATER BEING WASTED · In connection with air conditioning and even if you don't install such a system, watch out for water conservation. Water is scarce almost everywhere today. Use every possible means for recirculation. Cooling towers will be a great help and save water. It is better to plan on saving water before you are forced to do so by the authorities.

... MACHINES THROWING THEIR WEIGHT AROUND · The principle of dynamic balancing will have to be understood and applied more widely in the equipment of the future. As speeds go up—*and they are going up*—centrifugal forces in rotating masses can present serious problems. Parts that have operated at slow speeds could be satisfied with static balance. But if you operate the same parts at higher speeds, they may vibrate extensively and even take off into space.

This means you should check for dynamic balance any existing equipment that is to be converted to higher speeds. Makers of new high-speed machinery will need to design dynamic balance into their products. Also, every time a rotating part has to be repaired, it will pay to check it for dynamic balance.

For example, when the commutator of a high-speed motor is turned, it usually needs rebalancing. Properly balanced rotors, impellers, fans, crankshafts, and the like will minimize undue strain and wear on bearings, and reduce machine failures and downtime.

Closely allied to the elimination of unnecessary vibrational forces is the use of vibration mountings. They can reduce the impact of shock loads and dampen all types of vibration.

... PLUGS IN WORKERS' EARS · You will have to take care of noise in the factory of the future, both inside and outside the plant.

Inside, your employees will demand it for comfort. Machines will be designed with that in mind. Make use of soundproofing materials and baffles, where noise is unavoidable.

Outside, the community will demand that you take action. Silencers and baffle chambers will have to be installed if you want to get along with your neighbors.

There'll be no room for dirt in your factory of the future

The factory of the future will stress good housekeeping for more than one reason. Well-kept grass plots and attractive landscaping will prepare employees and put them in the frame of mind to promote cleanliness inside the plant building. Morale will also be improved. Employees will like to come to work in the morning.

Another good reason for nice-looking grounds: They will help you convince civil authorities that you are really trying to control gases, fumes, dust, and smoke. They are an important factor in good community relations.

VACUUM CLEANERS · Inside the plant vacuum cleaners will be standard equipment. Some systems will be piped all over the plant. Other units will be portable. Cleaning by blowing dust off machines with compressed air must go.

FLOOR-SWEEPERS · Your factory of the future will have to have power-operated floor-cleaning equipment. One man on a power sweeper can do the work of several hand sweepers—and do it a whole lot better.

PAINTING · Here is another important tool of good housekeeping for your factory of the future. The use of color will be a must. A well-painted plant keeps employees on their toes to keep it neat. Unless plants are well painted, it will be hard to convince operators of automatic equipment that management considers what they are doing to be of much importance.

SEVEN SIGNIFICANT PLANTS 1951 – 1952

NO. 1

PLANNED FOR THE FUTURE

THEY WANTED A PLANT that wouldn't be out of line with today's demands. But one able to cope with future needs.

And that's just what AiResearch Manufacturing Company of Arizona got. Its new plant in Phoenix is built for today's demands with tomorrow's in mind.

Ground was broken in March, 1951, for the 100,000-sq. ft. central core. It houses production, supervisory areas, and office space. It was occupied August 20.

NAME: AiResearch Manufacturing Company of Arizona, Division of Garrett Corporation
LOCATION: Phoenix, Ariz.

PRODUCT: Aircraft component parts and accessories
EMPLOYEES: 425 (potential 2500)

ARCHITECT: Howard P. Hess, Los Angeles
ENGINEER: Donald Douglas, Los Angeles
BUILDER: Panelcrete Engineering Company, Los Angeles

Nearing completion now is a 54,000-sq. ft. addition, to house more production, warehousing, and a cafeteria.

NON-STOP PRODUCTION · Located on a 43-acre plot, the ultimate 750,000-sq. ft. plant can be completed without interruption to production.

The original factory-office building is 300 feet deep, with 212-ft. frontage. The addition nearing completion adds 120 feet to the frontage. Ultimately the building will be 500 by 452 feet.

LOOKING AHEAD · A good example of the "eye-to-the-future" planning is the warehouse now being built. It is 200 feet from the rear of the present building. When the plant is complete, the warehouse will form the northwest corner of the structure. The warehouse can expand forward or the main building rearward.

The front of the building—the office

EXPANDABLE north, south, west, and up, the Phoenix plant of AiResearch Company of Arizona is really planned to meet both today's production demands and tomorrow's needs.

area—is trimmed with Arizona fieldstone, cut in thin courses to get a horizontal effect. Heat-absorbing glass has been used in doors and windows.

Materials were selected for utility, speed of installation, and ability to weather Arizona's desert heat conditions.

Design Problems Overcome

- Speedy expansion with no break in current production.
- Stabilization of factory air pressure and air conditioning system.
- Incorporation of packaged power units independent of one another and of the existing power system.
- Maintenance of work-flow efficiency.
- Full use of expendable materials as the plant is expanded—ultimately using movable walls and materials until the full plant capacity is reached.

OUTSIDE • Four-foot overhanging louvers—combined with heat-absorbing window glass—reduce the job of the plant's air conditioning system. And it's a big job when your plant is situated in the Arizona desert.

INSIDE • Two-deck "mezzanine" running through the center of the factory from the front office section to the rear serves as an administrative core. It will be extended as the plant continues to expand.

Turn the page

Begins on page B-102

Expansion Map Guides AiResearch Growth...

BUILDING GROWTH is planned well in advance to meet future production demands. In the schematic drawing (upper left), black areas indicate the original buildings, totaling 100,000 square feet. Gray areas are now under construction—another 54,000 square feet. Speckled areas will come later.

The primary core of the AiResearch plant is a 100,000-sq.ft. area—shown in solid black in the sketch above. It houses production, office, and supervisory areas. Construction is steel-frame with metal roof decking designed to make horizontal expansion easy.

ADDITIONS STARTED • Expansion of the central core is already underway—shown in light gray in the sketch. This construction adds 54,000 square feet to the plant. Future construction—see speckled areas in diagram—will bring the plant to a total of 750,000 square feet.

REMOVABLE WALLS • The plant is one-story, windowless, with both side and rear walls of the central core constructed of Robertson "Q" panels—double-walled steel with a glass fiber core. They are welded in place.

These walls are removable for future expansion. During expansion, the original "Q" walls of the core will be removed to become temporary outer walls. When the plant reaches its final stage, the outside walls will be precast, tilt-up concrete slabs.

The "Q" panel construction is arranged so that the top 36 inches can be removed at points where steel support columns pass. This permits the columns to be integrated with new construction without disturbing the rest of the wall. Where portions of the panels are removed and a new girder is connected, the 36-in. air space is plugged with glass fiber to avoid changes in the air conditioned atmosphere within the original core. Work is not interrupted.

...and Type of Construction Makes Change Easy

"Q" PANELS are used for all temporary outer walls. Dark areas on the upper section of the wall are plugs in the "Q" panels that seal in the controlled atmosphere while plant is being expanded.

PERMANENT OUTER WALLS of the factory are precast, tilt-up concrete slabs. They are being used in the outer walls of the warehouse, heat-treat building, and the cafeteria now under construction. They'll also be used as the outer walls of the completed factory.

OFFICE AREA ROOF is designed to support a second story. Column supports project 14 inches above the roof level. Caps are easily removed. Second-story columns can be tied directly to first-story columns without damage to the roof. Roofing is really a floor, covered with a removable material.

A ROOF THAT'S A FLOOR • The front office area of the plant has been designed to accommodate a second floor. The roof is nothing more than a floor covered with a roofing material that can be peeled off when the second story is added.

A feature of the construction is the double-deck mezzanine which splits the factory area in two. The mezzanine contains tool cribs, inspection stalls, supervisory offices, and lavatories. The mezzanine will be extended as the plant grows.

STRAIGHT-LINE FLOW • From this central core a flow-pattern feeds from the administrative offices to the work areas. The tool cribs, inspection stalls, and supervisory offices are on the ground floor. Engineering offices, files, and self-contained power units are located on the upper level.

A NEW PLANT can be more than just a better place to work. It can be a new deal where methods can be analyzed and improved. It can also be a sort of challenge to everyone

SEVEN SIGNIFICANT PLANTS 1951—1952

NO. 2

MACHINE TOOLS are grouped according to function. By so doing, Barth reports that it gets maximum supervision with a minimum of supervisors. The plant area is not partitioned.

NEW PLANT INSPIRES NEW

NAME: Barth Stamping & Machine Works, Inc.
LOCATION: Cleveland

PRODUCT: Dies, small stampings, specialized machinery
EMPLOYEES: 260

DESIGNER: McGeorge-Hargett & Associates
BUILDER: Industrial Construction Company, Inc.

PEOPLE WHO MOVE INTO NEW PLANTS are thrice blessed. They have a better place to work. They have a brand-new chance to analyze old methods —and improve them. They find, in the new plant itself, real inspiration to come up with better methods.

At least that seems to be the case at Barth Stamping & Machine Works. Its move into a new

to do a better job. And that's just what this good-looking new plant was to Barth Stamping & Machine Works. Improved methods will save the company $100,000 a year.

DRAFTING ROOM LIGHT, like all other light in the plant, is from fluorescent lamps. Several types of luminaires are used: factory troffers, egg-crate troffers, and corrugated plastic.

METHODS

plant last fall was accompanied by a burst of better methods.

And the management sees a definite connection between the two events.

To understand both cause and effect, let's have a look first at the plant that inspired the new methods.

Here (next column) are some of the highlights:

SIZE OF PLOT • Plant is on an 8½-acre plot, triangular in shape, 100 feet deep and 700 feet across.

LOCATION ON PLOT • The plant is set back 100 feet from the curb of a 4-lane highway that runs east and west in front of the building.

FUTURE EXPANSION • There's lots of room to grow toward the east.

PARKING FACILITIES • There are two parking lots — one for employees, one for visitors. One holds 140 cars; the other, 30 cars.

SIDEWALL CONSTRUCTION • Sidewalls are concrete block topped by continuous operable sash. Above the sash, corrugated asbestos sheets are used.

ROOF CONSTRUCTION • Roof is conventional felt, tar, and gravel. It's pitched slightly for drainage.

FLOOR CONSTRUCTION • In the two forward bays, wood block floor is used. The high-bay floors are concrete. The office section floor is black-and-gray mottled asphalt tile.

FRAME CONSTRUCTION • Riveted steel. Designed to carry an additional 2-ton suspension from any one point. The extra-heavy framing was dictated by the many overhead hoists used in the plant.

PLANT HEATING • In the plant, gas-fired unit heaters. In the offices, fin-tube radiation, hot water units. Convectors are located under the windows.

PLANT LIGHTING • Fluorescent lighting throughout the plant. At machines, supplemental lighting.

PLANT VENTILATION • Two roof ventilators provide adequate air circulation throughout the year. Sidewall sash can be opened.

CEILINGS • In office areas, acoustical tile.

POWER • It's purchased, coming to the substation at 4160 volts. Stepped down to 440, 220, and 110 volts for plant use.

PARTITIONS • There are no partitions in the manufacturing area, except for steel wire fencing used to close off the toolroom and steel supply areas. In the office metal, movable-type partitions.

LAYOUT • Functional. Grinders, lathes, millers, and presses are grouped in departments for effectiveness and economy of supervision.

Now let's look at some of the better methods that were inspired by the new plant.
Turn the page

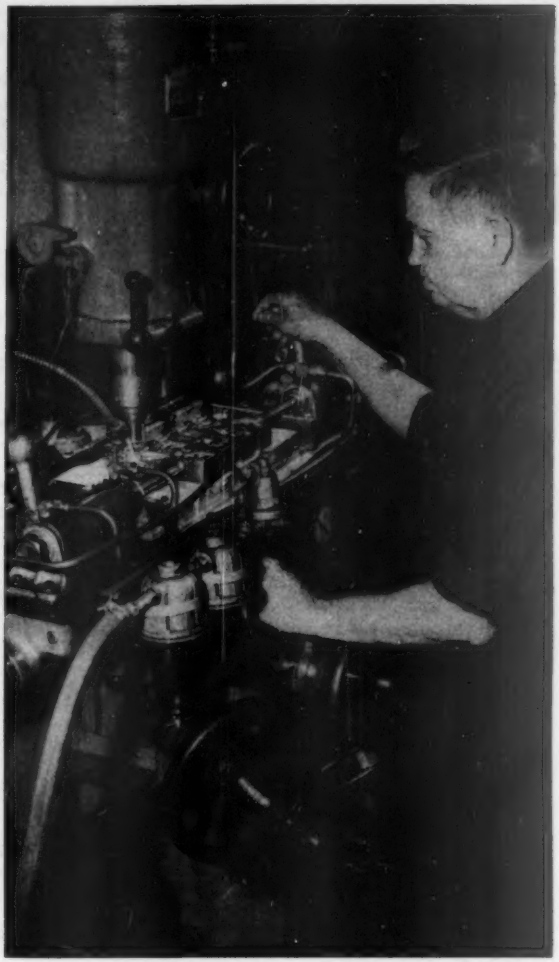
Begins on page B-106

Typical "Better Ways" Inspired by New Plant

Methods improvements in the new Barth plant are beginning to pay off. In the last two months, total manufacturing costs have been 9% and 7% less than they were in the old plant. Barth management expects the improvement to average out at a little above 5%. These figures mean that the new plant has stimulated ideas that have saved the company more than $100,000 annually.

John Barth, vice president and chief engineer, is responsible for a lot of the new production ideas in use in the plant. While the new plant was still in the blueprint stage, he got department heads together and set in motion the search for better methods.

When the new plant was completed, employees moved right into new ways of doing things. These two pages—and the two that follow them—show you some samples.



CLAMPING FIXTURE SPEEDS MILLING

Two single-spindle milling machines, equipped with hydraulic clamping fixtures, turn out 100 pieces an hour. Each machine holds four pieces at a time. One operator runs two machines. Output from the machines has increased more than 200%. The installation consists of two hydraulic valves and two hydraulic cylinders, plus the essential copper tubing and fittings.

When the lever at right (in operator's hand) is thrown, pistons of the cylinders on each side of the fixture move forward and enter holes in the fixture and in the pieces being milled. The piston shafts meet at the center of the fixture after having locked the four pieces in place. Once the pieces are clamped in place, the milling cutter moves into position and begins its cut on the first piece.

The two milling machines are cycled so that one machine is being unloaded and reloaded by the operator while the other is in the cutting portion of its cycle.

SCRAP HANDLING EQUIPMENT GIVES SPEEDY SERVICE

This scrap carrier is placed at any of the big presses running items that produce considerable sheet scrap. When it's filled, the fork truck operator on tour picks it up and locks it to the uprights of his truck. He moves the carrier 200 feet to a truck trailer outside.

There he dismounts from the truck and lifts a lever on the carrier. This unlocks the carrier box. And, because of its unbalanced load, the carrier rocks forward on the bottom rockers until its load dumps into the trailer. Teeth in the rockers keep the carrier on the track. In a few minutes the carrier is back at the press ready to collect more scrap.

AIR EJECTOR PERMITS HIGH SPEED

A small dome-shaped part made of stainless steel is placed in the press by the operator. As he steps on a foot pedal, lancing dies converge toward the part to be lanced. Actually, all press movement is in the horizontal plane. As the press closes on the part, it lances it in three places, and indents and pierces it in another place. The air cylinder at left then returns the press to its open position, and at the same time a jet of air blows the part into the U-shaped length of stovepipe.

Ejection takes place so fast that as soon as the press is opened the operator can put a new piece in without loss of time. This ejector was developed originally as a safety device to keep the operator's hands out of the press.

HORSES INCREASE DRILL'S FLEXIBILITY

This radial drill is working off its regular base. The work being drilled — a hydraulically operated piercing unit — is supported on steel sawhorses. Shims are placed between the horses and the 4-in. steel plate to keep the work absolutely level. Ordinarily this job could be handled on the regular drillpress base, but in subsequent stages of assembly the plate must be drilled. So, to eliminate the need for separate set-ups each time drilling has to be done, the unit is mounted off the bed. Then the drill can operate either over its bed or over the piercing unit.

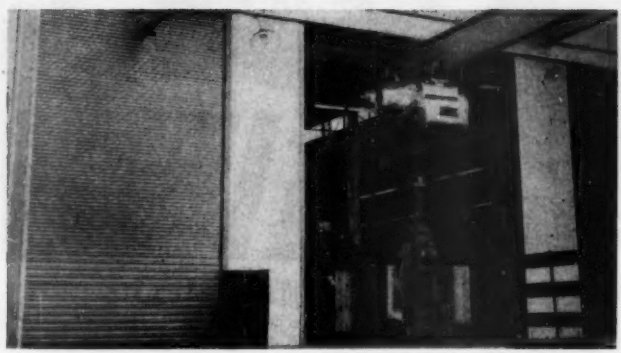
It's easy to swing the radial arm back and forth as needed. Then, too, it is much easier to mount the piercing unit as shown here than it would have been to mount it on the drill bed. *Turn the page*

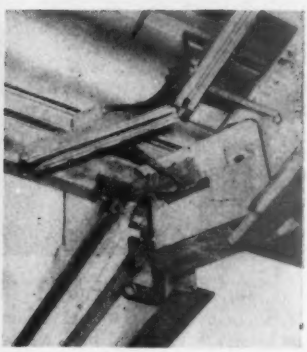
SWINGING JIB SIMPLIFIES BAR-STOCK STORAGE

Steel I-beam, pivoted at one end and used as a jib, is centered above the bar-stock storage rack. It supports a hand-operated ½-ton hoist which can roll the full length of the 8-ft. jib to support the weight of bar stock being removed from or placed in the rack. With the forward end of the stock held by the hoist hook, it is quite easy to drag the heaviest piece out of the rack. Then, by shifting the position of the hoist chain on the bar, the total weight can be lifted and moved to power hack saws in the shop.

Although two men are shown removing the bar stock, it's an easy 1-man job to handle even the biggest piece in the shop.

The jib's pivot is bolted to the upper frame member of the storage rack and also to the steel building beam above. A length of wire cable mounted at the top of the pivot pin and extended downward and outward toward the free end of the jib supports the jib and its heaviest load in cantilever fashion.





EXTENDED CRANE RAILS SERVICE SHIPPING DOCKS

Electric-powered 5-ton hoists can scoot out of the plant on overhead rails and move right over highway trucks parked at the shipping docks. Hoists work for either loading or unloading. The crane rails extend about 25 feet inside the building. Large overhead cranes move materials to and from the rail ends.

There are three such crane rails passing through as many doorways. Besides this 5-ton hoist, there is a 1½-ton power hoist and a 2-ton hand hoist. Switches for the hoists are mounted on the building columns inside the plant at the end of the rails. To permit doors to close, a special switching method (see above, right) has been developed.

A long pole with a hook end is all that's needed to open the switch. First a locking bar is lifted to free the switch on its pivot. Then the hook is engaged in an eye in the movable section of the rail, and the section is pulled open. As it opens, a corresponding length of conductor bar opens and a safety block drops so hoist can't run off rail.

FLEXIBLE TABLES SPEED DIE WORK

Five tables, built of structural steel shapes, are used for die assembly. These simple welded tables have three horizontal stringers that can support dies weighing several tons. Dies can be placed on the tables either by fork truck or by overhead hoists. They have been designed so the forks of the truck fit between the center and outside stringers.

Over each table is an I-beam with a 2-ton hoist. The dies are delivered by truck. Then the diemaker can use the hoist to move the dies around on the table when he is assembling or disassembling them.

Tables are 12 feet long and 34 inches high. When small or irregularly shaped dies are to be worked on, wooden boards are placed across the stringers for support.

Outside stringers are each placed 21 inches from the center stringer. This spacing permits the diemaker to work on the underside of the die when necessary. With five tables and five hoists, diemaker has his own complete work area, can work unhampered by lack of equipment or space.

CANVAS SHIELDS PERMIT CLOSER MACHINE SPACING

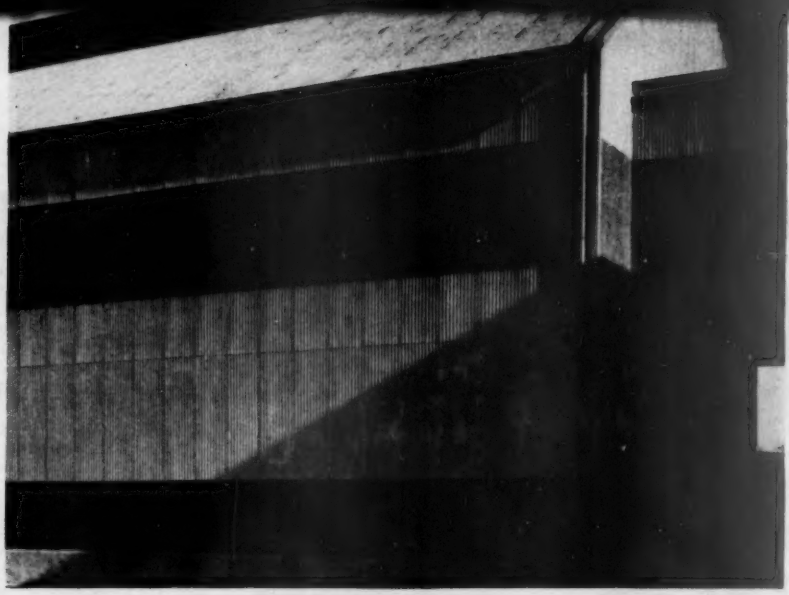
Lathes at Barth are spaced at the *minimum* interval. Cutting oils flying from spinning lathes used to splash the operator ahead. Shields were the simplest remedy. Each is made of steel pipe and metal scrap. The 3-ft. square canvas is hung from a horizontal wooden arm.

Since the shield is placed as close to the back of the lathe as possible, flying oil and chips hit the shield, not the next operator up the line.

The shields cost about $5 for labor and parts. That's nothing compared to the saving on operators' clothes and the extra lathes Barth now has room for.

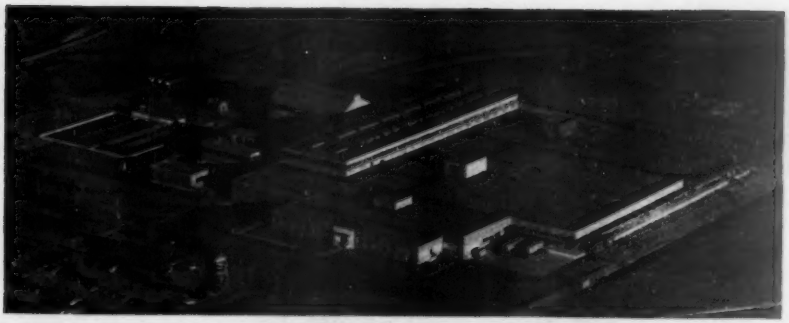
SEVEN
SIGNIFICANT
PLANTS
1951 – 1952

NO. 3



TRANSLUCENT CORRUGATED BAND of reinforced plastic transmits a soft, pleasant light into the batch house. It's one of the ways this new Owens-Corning plant uses its own products.

BUILT TO BEAT PROCESS HEAT



AERIAL VIEW of the new plant shows that there's lots of room to expand on the 134-acre site. Spray pond (far left) supplies water for the radiant cooling panels that absorb radiant heat from the melting furnace. Batch house, boilerhouse, and furnace hall (upper center) use translucent reinforced plastic to let light into the buildings. All loading and unloading facilities are along the south side of the building (right).

NAME: Owens-Corning Fiberglas Corporation
LOCATION: Anderson, S. C.

PRODUCT: Fiberglas textile yarns
EMPLOYEES: 989

ARCHITECT & ENGINEER: Lockwood Greene Engineers, Inc., New York
BUILDER: Daniel Construction Company, Greenville, S. C.

FURNACE HALL gets relief through 30,000-cfm. blowers. Cool air from floor below also helps cut excessive heat.

CAFETERIA, like all manufacturing areas, major service areas, and offices, is air conditioned. It serves the whole plant.

MAKING GLASS IS HOT BUSINESS. Temperatures run well above 2000 F. That means the plant must be well engineered just to make it livable. And the new Anderson, S. C., plant of Owens-Corning Fiberglas Corporation is just that —livable.

A good air conditioning system, plus the use of Fiberglas insulation and materials in the right places, beats the process heat inside the plant.

THE PLANT • It's a single-story brick and insulated-steel-panel building, with 265,400 square feet of floor space. It's situated on a 134-acre plot.

The one-story construction means maximum efficiency in continuous glass-making operations. The plant is near-square, with a notch at the southeast corner for highway truck loading.

Across the front is a 45x210-ft. section, housing administrative offices and reception lobby.

AIR CONDITIONING SYSTEM • All manufacturing areas, offices, major service areas, and the cafeteria are *completely* air conditioned. But, because of the extremely high melting heat, it was necessary to develop a new approach to get good air conditioning in the furnace hall. The Carrier engineers, who designed the new system, feel it may be a possible solution to many other air conditioning problems heretofore considered insurmountable.

A series of radiant cooling panels and shields flank the sides and front of the furnaces. Panels are set two or three inches from the furnaces.

Necessary cooling effect is achieved by circulating 85-deg. water through the panels. Slightly higher heat-removal capacity that could be gained from using refrigerated water was insufficient to justify its use. Cooling panels remove a heat load equal to 385 tons of refrigeration.

Conditioned air is supplied by ducts from four central station units located at various points in the plant. A single refrigeration system circulates chilled water to these units.

USE OF FIBERGLAS • The plant is a wonderful showcase for its own products. Wherever Fiberglas would improve working conditions—or improve appearance—it was used.

Roof insulation serves as a heat barrier and contributes to the plant's air conditioned comfort.

Acoustical materials trap sounds and help provide efficient working conditions within the office areas and cafeteria. Acoustical board forms a suspended ceiling over the noisier sections of the finishing area. Various types of acoustical tile are used where needed in the plant.

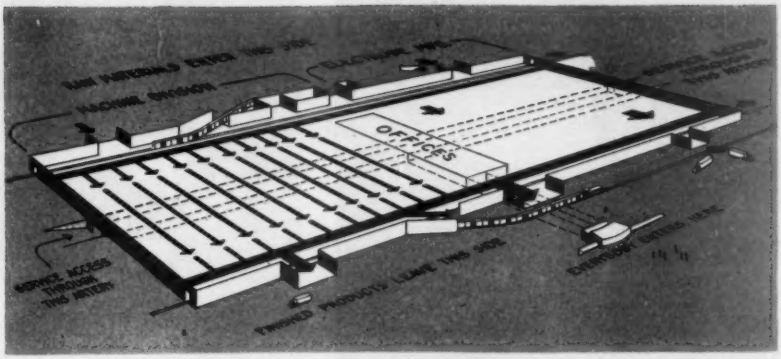
All dirt is caught at the intakes of the air conditioning system by glass fiber air filters. The filters operate in banks ranging from 8x5 feet to 10x7 feet. Air conditioning ducts are covered with a material that gives both thermal and acoustical insulation.

A special pipe insulation is used on all steam and chilled water pipes; another type on steam boilers and all tanks and lines used for application of sizing on the glass filaments.

All motors, generators, transformers, and power lines are glass-fiber insulated. Underground distribution lines of the natural gas system are wrapped with still another glass-fiber material that has been impregnated with hot bituminous enamel.

SEVEN SIGNIFICANT PLANTS 1951—1952

NO. 4



WELL-PLANNED FLOW PATTERN permits Lincoln's point-of-use storage technique. Strictly straight-line manufacturing operations run the width of the plant along building columns. Underground tunnel carries traffic, utilities, and employee facilities. This leaves plant bays free for unobstructed storage.

WELL-BUILT PLANT has curtain wall exterior for most part, brickwork in spots. Curtain wall was fabricated on the job from interior steel panels 25 feet high, glass insulation, and a facing of rolled aluminum sections. Handsome entrance house takes all employee traffic. Underground tunnel

DESIGNED FOR POINT-OF-USE STORAGE

NAME: The Lincoln Electric Company
LOCATION: Euclid, Ohio

PRODUCT: Welding equipment
EMPLOYEES: 1082

ENGINEER & BUILDERS: The Austin Company, Cleveland

THERE'S NO CONVENTIONAL WAREHOUSE in the new Lincoln Electric plant. *The whole plant is a warehouse.* It's built around point-of-use storage. Raw materials go directly to the spot where they're used. There's no separate stores-keeping function, no inventory paperwork, in the usual sense. Material is delivered as needed and reordered when stocks are visibly low.

The result, as Lincoln sees it, is a plant that takes a heavy bite out of indirect labor costs—materials handling, inspection, supervision. No material is moved twice in the same form. Inventory is effectively controlled by a visual check out on the plant floor.

A PRE-TESTED PLAN · It's no accident that the new Lincoln plant is delivering as expected. Planning began as early as 1946. And to pre-test its

FACTORY IN A STOREROOM is result of Lincoln's careful planning. Here electric welders ride final assembly line down row of columns. Parts and materials stored in center of bay feed into line where they are needed. Foreman at right needs only visual check to keep track of inventory. Note how lighting, tempered air outlets are concentrated in the work area.

theory of point-of-use storage, Lincoln installed a mock-up section of the new plant in its old facility. The company found this pilot unit paid off handsomely, so went ahead.

The new Lincoln plant at Euclid is a carefully planned pattern of flow—flow of materials, services, and personnel. Receiving rail and truck docks line the back of the plant; a similar shipping dock stretches the length of the front of the plant. Between the two are manufacturing and assembly lines that are really straight.

These conveyor lines hug the column rows across the width of the plant. That leaves most of the area in each bay free for point-of-use storage.

UNDERGROUND FACILITIES · To help keep bay areas unobstructed, Lincoln went underground: A corridor running the full length of the plant contains all employee facilities, service piping, and electrical load centers. It also serves as the through route to carry all employees to their work stations. The result is a 1427x500-ft. manufacturing area, broken only by the office block in the center.

Since almost all activity goes on along the column rows, Lincoln can concentrate its lighting and ventilation along the same lines—right where the workers need it. Adjustable duct outlets deliver tempered air from each column at a point only 8 feet from the floor. That means Lincoln heats the workers, not the plant, and cuts its air distribution costs by more than 70%.

For flexibility Lincoln chose a 40x60-ft. column spacing, a clear truss height of 23 feet. This gives overhead cranes ample operating space, permits bay storage to a height of 17 feet. Each bay has its own overhead crane. A transfer device on the receiving dock permits any crane to move from its own bay to any other bay in the plant.

SECOND STORY POSSIBLE · Thanks to high truss height the central office block has been built with a second story. This will be occupied as plant operations expand. Plant exterior is a 25-ft. curtain wall on top of a 9-ft. brick sill. The curtain is an insulated sandwich of steel, glass, and aluminum that can be expanded readily with the plant.

SEVEN SIGNIFICANT PLANTS 1951 – 1952

NO. 5

THEY GOT A LOT FOR THEIR MONEY • Building is top quality, a fine example of contemporary architecture. Low cost is not the result of unusually favorable factors. For example, a curved wall, made necessary by an existing railroad siding, added to construction difficulties—and to cost.

IT COST

NAME: C. O. Owen & Company
LOCATION: Maywood, Ill.

PRODUCT: Printed matter
EMPLOYEES: 150

ARCHITECT & ENGINEER: Rodde-Anderson-Novak, Chicago
BUILDER: Sherman Olson, Inc., Chicago

THEY BROKE WITH TRADITION • Cantilever frame construction saved tons of material. Bar joists, welded to top of beams, eliminated costly fabrication. Architects studied costs of all possible materials just before plans were detailed, and specified those that cost least at that time.

ONLY $4.55 A SQUARE FOOT

DOES THE $4.55-PRICE of this plant fail to ring a bell in your cost consciousness? If so, you ought to know that it's about half of what might be considered a normal price for a Chicago plant.

The low cost is not attributable to any special conditions. Most of the construction problems were common ones. The plant is in a temperate climate (with heavy snow loads to consider), and the presses used in the plant weigh over 25 tons (floor load is about 1000 pounds per square foot). In fact, some special problems—the curved wall made necessary by an existing railroad spur, a diagonal wall in the front of the building, and an unusually high water table—added to the cost.

The plant is 243 feet wide, covers 83,400 square feet. It's one story, has 7500 square feet of office space. Front of building is faced with red finish brick. Rest of building is common brick (less than half as costly) and cinder block.

Office space is modern and attractive. Cost was saved here, too. For example, office partitions were built on the job, cost half as much as mill-made partitions. Ceilings are acoustical tile; floors, asphalt tile; walls, plaster.

EXTRA HEATING CAPACITY · The plant is steam heated, through unit heaters. But—so that the office could have more comfortable hot-water heat—a $1500 hot-water converter was installed.

Two low-pressure boilers supply heat in the plant. One is enough for all but the coldest days. Together, the boilers have enough capacity to heat a building the size of the entire plot—if it ever comes to that. The plant uses only 620 gallons of oil over a 24-hour period in zero weather.

WHEN EXPANSION COMES · At the end of each beam of the overhead frame, there's a small removable section of sash. When a new section is added to the plant, the new framework is built in line with the existing frame. The new floor is laid. The brick section of the wall is erected. Then the small sash is removed, and the two sections of frame are connected (with no interruption to production). Finally, over a week end, the steel sash is removed from the old wall, placed in the new. Owen has already added 7000 square feet.

How Did They Get All This at Such Low Cost?

Mostly by throwing out traditional building methods. The steel frame was erected, the bar joists were welded in place, the brick wall was built, the floor was poured, the boilers were installed—all at the same time. The steel frame was erected in three days. Total building time—during a tough winter—was only 4½ months.

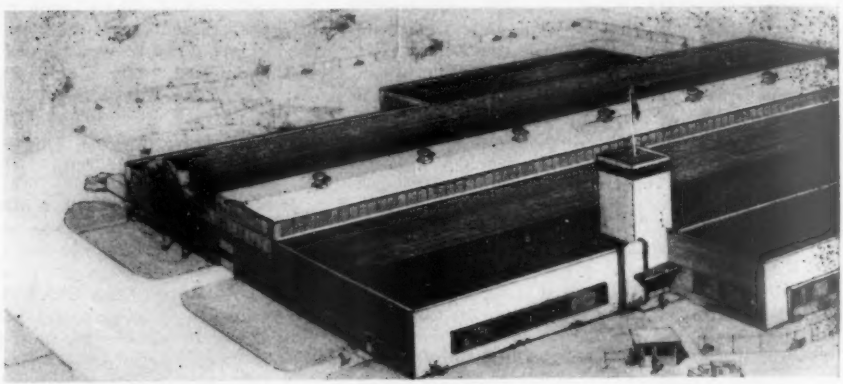
Least costly type of construction, plus the use of a minimum tonnage of materials, was a most important factor. The width of the bays was carefully calculated so that a minimum tonnage of steel was used. Height of ceiling is maximum possible with 6-in. columns. Roof is metal deck, covered with 1 inch of insulation, then tar and gravel.

Mentioned earlier, but so important that it bears repeating: The architects sat down with the builder and suppliers, just before the plans were detailed, and studied the cost of all possible materials. Those that had the best price at the time were specified, and promptly ordered.

SEVEN SIGNIFICANT PLANTS 1951 — 1952

NO. 6

CONVERTIBLE DESIGN in the new Reliance plant required wide (40x50) column spacing. There's flexibility in the overhead crane system, too. The 5-ton crane in the background now serves a plant area only 60 feet long. But for future needs crane rails have 15-ton capacity and are 440 feet long.



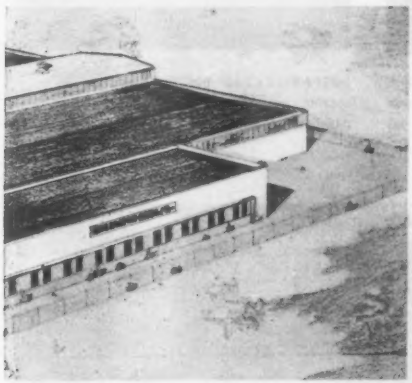
PLANNED FOR THE FUTURE, the Reliance plant has 60 acres of land for further expansion. The building has steel framing, concrete floors and founda-

NAME: The Reliance Electric & Engineering Company
LOCATION: Euclid, Ohio

PRODUCT: Electric motors and controls
EMPLOYEES: 425

ARCHITECT & ENGINEER: Arthur E. Rowe & Associates, Cleveland
BUILDER: Albert M. Higley Company, Cleveland

PRESSURIZED VENTILATION necessitated outer and inner doors at receiving dock to maintain slightly elevated plant air pressure, keep out dust.



tion. Outside walls are face brick and block, topped with steel sash in the manufacturing areas. Blue-tinted glass on south and west cuts heat and glare.

IT'S PRESSURIZED—IT'S CONVERTIBLE

FIRST THING THAT STRIKES YOU about the new Reliance plant is the dust-free atmosphere. And there's good reason why. The plant is completely pressurized. Pressure inside the plant, slightly higher than the outside air, helps keep unwanted dirt out—and also exhausts stale air.

NO WINDOWS, NO FANS · The Reliance people needed a clean plant to permit accurate manufacture of precision motor and control parts. They also wanted an efficient working atmosphere for their employees. So they threw out conventional heating and ventilating designs—and built themselves a pressurized box.

The Euclid plant has no windows that open in factory or office areas. It has no exhaust fans. Air under slight pressure circulates through a system of ducts with outlets on every building column. Spent air discharges automatically through eight pressure hoods on the roof.

CONVERTIBLE · There's much more of significance to the new Reliance plant than its ventilation system, though. It is designed to be truly convertible. It had to be, to take care of the sharp swings in a-c and d-c motor production, and also to take into account the projected increase in motor demand in the future.

So first of all Reliance planned for future expansion. The present building of 133,000 square feet can be expanded to the north and west. And there's plenty of room on the 60-acre site for additional facilities.

Reliance has checked its future electrical needs, too. Bus duct has sufficient capacity to carry the projected plant load for at least five years. Instead of buying power at 440 volts, Reliance had the local utility set up a 4160-volt substation in the middle of its site. Next time the company builds, a power supply to meet increased demand is assured.

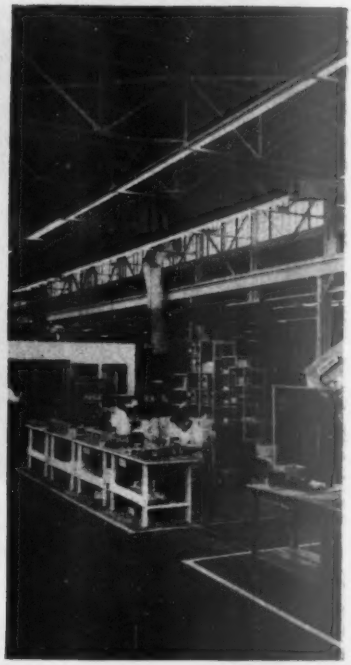
FLEXIBLE · The Euclid plant had to be flexible, too. Each manufacturing area is designed so that it can be readily adapted to other use. This meant large unobstructed manufacturing areas, with all services carried overhead. Furthermore, should new manufacturing space be needed fast, Reliance can expand into its engineering offices. These offices look permanent, but actually the whole department has been built into the plant on a temporary basis. A false ceiling conceals the regular factory construction.

To see how Reliance has built flexibility into its new plant, turn the page.

Begins on page B-118

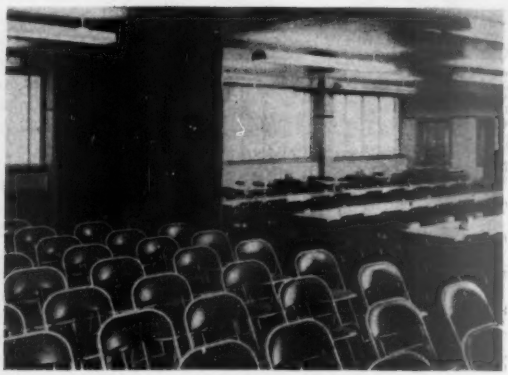
Flexibility Is Reliance "Theme Song"

FLEXIBLE LAYOUT results from high unobstructed plant walls. Thin strip of sash stands 12 feet from ground, so warehouse materials can be piled high against outside walls. In factory, high sash permits flexibility in machine location.



PREFABRICATED SHOP OFFICES are spotted at strategic points. They have panelized construction, so can easily be

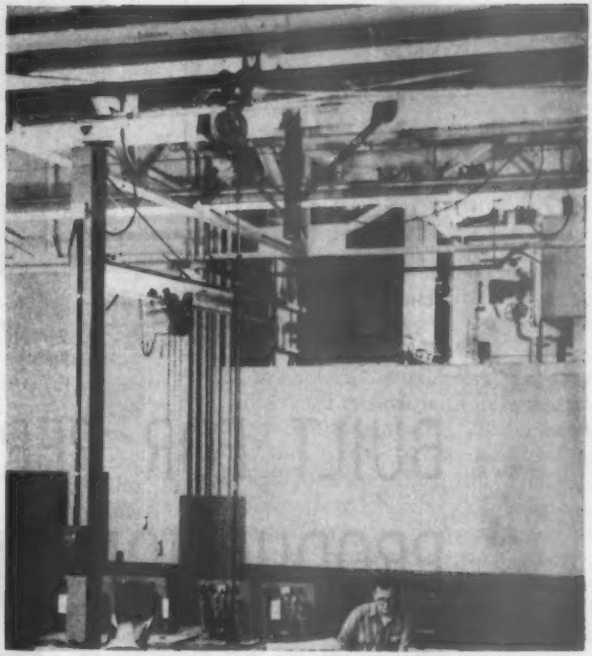
VERSATILE PARTITIONS do more than divide this drafting room into cubicles. Made of plywood and of cabinet depth, they also support bookshelves and desk tops at different levels.



TWO-WAY STRETCH is provided by adjoining cafeteria and conference rooms. This set-up is handy for meetings that may

Motor demand fluctuates sharply; projected expansion loomed large. But with flexible features this new plant can take future change in high gear.

dismantled and moved whenever layout changes. They are completely soundproofed for efficient office operation.



INDEPENDENT BOILERS — two gas-fired units—installed in gallery over office area take care of office heat and hot water needs. These boilers, plus individual gas-fired unit heaters in factory area, eliminate the need for a large central boiler room.

begin or end with refreshments. And either cafeteria or conference room can readily overflow into its neighbor.

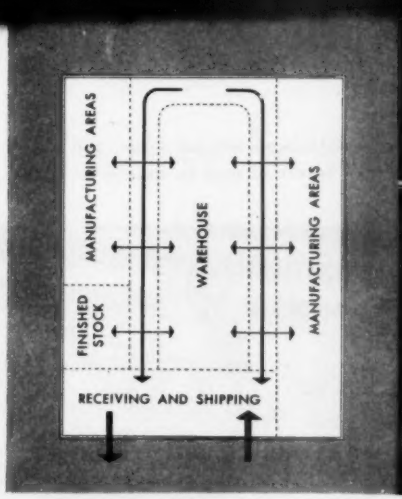
Reliance a Good Neighbor, Too

Reliance built its Euclid plant right next to a residential area. Company officials were naturally concerned with the effect of the plant's appearance on its neighbors. So they took these three steps towards good community relations.

- They gave considerable attention to the shape and placement of the plant on its 60-acre site. All sides of the building are set back at least 150 feet from the property line. Because of deep backyards, there's at least 225 feet between the plant and the nearest home.
- All housekeeping operations and unsightly facilities such as incinerators, storage areas, and rail sidings have been located on the side of the plant away from homes. And the rear of the plant has been faced with brick to present a neater appearance.
- As a further step in good neighborliness, Reliance has set aside a 3½-acre plot as a community park. It will be fenced in at company expense and reserved for use by near-by families.

SEVEN SIGNIFICANT PLANTS 1951 – 1952

NO. 7



SCHEMATIC DIAGRAM shows the in-and-out flow of raw materials from the central warehouse of the new Ciba Pharmaceutical plant. With manufacturing areas located on the periphery, employees get the benefit of seeing the sky—a definite plus, says Ciba. Atmospheric conditions are rigidly controlled.

BUILT FOR PERIMETER PRODUCTION

DESIGNERS OF THE NEW manufacturing building completed late last fall by Ciba Pharmaceutical Products, Inc., had a keep in mind that four separate manufacturing operations had to flow out of a single raw materials warehouse. And that all finished goods would be stored in a single finished-stock warehouse.

A plant built for "perimeter production" was the answer they chose.

The raw material warehouse forms the central core (see diagram above). Around it in a U-shaped arrangement are manufacturing areas, finished stock warehouse, and offices.

Raw materials enter from the front of the building at one side of the main entrance. They flow easily from the warehouse to the manufacturing areas.

When products are finished, they are moved to the finished goods warehouse. The finished products exit also flanks the main entrance.

Manufacturing areas and the finished products warehouse are separated from the raw materials warehouse by a 12-ft. aisle for ease in materials handling.

Building material selection was based almost exclusively on ease of maintenance and expansion. Most inside walls and partitions are 8-in. thick, 5x12-in.-face terra cotta tile. Some walls are glazed tile to meet process requirements.

NAME: Ciba Pharmaceutical Products, Inc.
LOCATION: Summit, N. J.

PRODUCT: Pharmaceuticals
EMPLOYEES: 200

ARCHITECT: Petroff & Clarkson, New York
ENGINEER: Guy B. Panero, Engineers, New York
BUILDER: John W. Ryan Construction Company, New York

Where you will find THE REAL REVOLUTION

"If we keep in mind the values of opportunity, competition, democracy, productivity, then it is our capitalist society which is the truly revolutionary one – the only society which offers true hope to the masses for release from the long nightmares of tyranny. It is we, not the Marxists with their reactionary ideas of the good dictator, who have the truly constructive, the truly revolutionary ideal."

—from "Capitalism" by David McCord Wright.

If we can only win recognition of this truth, we shall win the struggle of free men against communism. This editorial discusses some of the hurdles that must be cleared.

To win the needed recognition that "our capitalistic society... is the truly revolutionary one," we must keep pounding away both abroad and at home. That is because the communists simultaneously attack us on an international front and try to undermine us from within.

The present drive to rearm ourselves and our allies is crucial to our self-protection on the international front. We must be prepared to meet the armed force of aggressive communism with armed force if we are to secure our physical freedom.

Arms are not enough

But to re-establish parity in arms is only half of the battle. In the last analysis it is not the more important half. To be effective, our arms must be backed by loyalty of men to our ideals. So, both abroad and at home, we must win men to the faith that we do have "the truly constructive, the truly revolutionary ideal."

On the international front, the effort to win adherence to such faith in our capitalist society meets tough going. That arises from the fact that in some of the countries that are allied with us in the fight against communism, capitalist society has offered to its people no such ideal. In varying degrees "the values of opportunity, competition, democracy, productivity"—those key aspects of American capitalism—are either absent or subordinated in their economic life. Indeed, the *Wall Street Journal* recently remarked that "to the European, capitalism has become synonymous with cartels—and with the disregard cartels foster for the consumer, the worker and the over-all well-being of the nation's economy."

No Simple Solution

Nonetheless, many European labor and governmental leaders sincerely believe that cartels are essential to their economic salvation. They believe that without such restrictions in congested European markets there would be intolerable cut-throat competition and instability of employment. Thus, when we point out that the cartel capitalism so prevalent in Europe lacks the constructive qualities of competitive American capitalism, we may offend European leaders, whose wholehearted cooperation we need in the fight against communism.

But, if we soft-pedal that contrast, we sacrifice the opportunity to win understanding and loyalty from millions of Europeans who have had no chance to learn that capitalism can be the constructive and liberalizing force that it is in the United States. Indeed, when many of these millions embrace socialism it is not because they love it. They are rather desperately seeking a tolerable middle course between what they consider the hateful extremes of communism and the undesirable aspects of capitalism as they understand it.

New name not the answer

We know that there is no easy way to handle the problems created by such misunderstanding of American capitalism. Neither do we share the belief that much of the difficulty would be overcome if we were to call American capitalism by some other name. By doing that, the argument runs, we shall relieve it from the unpleasant connotations that are attached to the word capitalism in some other parts of the world. But, after all, if we are to give up all the terms that have come to mean something else in other parts of the world, we must begin by ditching the term "democracy" which, in the official jargon of the Kremlin, seems to mean what we call dictatorship.

In spite of the difficulties, however, we must stick to this job of exporting the truth that our capitalist system does offer opportunity, competition and democracy. We must let the rest of the world see that it means a continuous drive for increased productivity, and the search for profits by increasing sales and consumption, not by trying to sell less for more.

Export alone not enough

The spreading of truth about American capitalism will not be effective if it is merely directed abroad. Unless it is carried on at home also, it will lack the driving faith that is essential to any convincing export of this type. Nor will export alone come to grips with the communist attack on our country from within—an attack that gets too much help from loyal Americans who short-sightedly repudiate the basic principles of our institutions in their efforts to reform some of their deficiencies. For success both at home and abroad, we must have right here at home a much more militant recognition that it is in fact our capitalist society which offers "the truly constructive, the truly revolutionary ideal."

Here at home, too, this raises difficult complications. Businessmen who are among the leaders and principal practitioners of capitalism, have generally been catalogued as conservatives. Hence, many people must stretch their imaginations a bit to see that businessmen are leaders of a development which has so greatly and so rapidly improved the lot of free men in America that it is truly revolutionary.

These difficulties of definition, however, are relatively superficial aspects of the problem of seeing our capitalist society clearly. The basic facts are that:

American capitalism is leading free men to an ever higher material standard of living while respecting their spiritual, social and political freedom.

Communism is leading its people back into a life of servile regimentation under dictatorship.

American capitalism advances to high ground never before attained by free men. Communism retreats to ground that men with an appetite for freedom throughout the ages have sought to escape. If we can establish this truth firmly, around the world, we shall no longer need to worry about communism. It will be hopelessly sunk.

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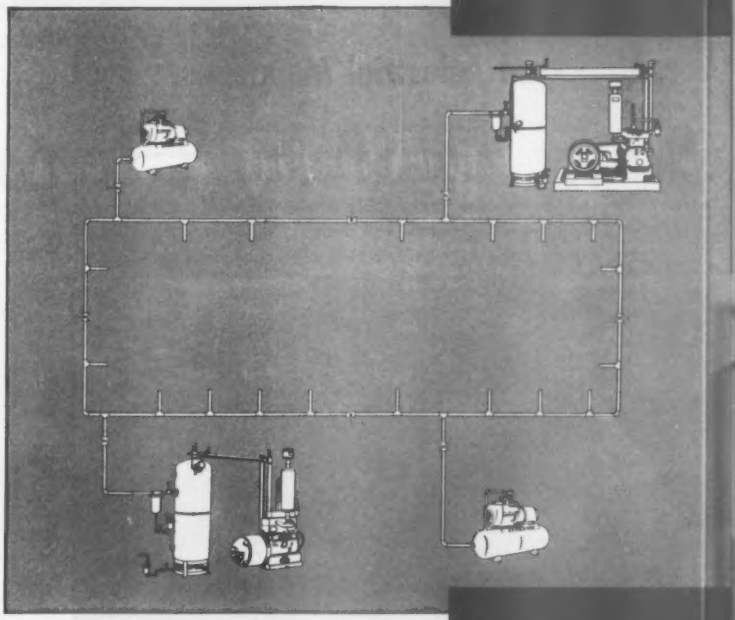
Here's a 24-pager that tells you all you need to know about a full line of glass blocks. Recommended light intensity data, selection charts, technical information. Catalog No. IB-2. American Structural Products Co.

20 Roofing & Siding
Here's a catalog on corrugated asbestos cement for roofing and siding. Detail drawings and technical data, recommended applications, and methods of fastening are given. Manual No. 910. The Philip Carey Mfg. Co.

21 Roofing & Siding
Features, application information, and installation procedures for roofing and siding in this 28-page catalog. Accessories section. Bulletin No. 47-2. Plasteel Products Co.

Turn to page B-132

HOW TO SAVE MONEY ON YOUR... AIR COMPRESSOR INSTALLATION



SCHRAMM UNIT SYSTEM

The perfect, money-saving, "inside-the-plant" air compressor installation is the Schramm unit system . . . whereby, in a minimum of space, you install one, two, three or more Schramm air compressors, according to your air needs, and operate them singly, or separately, as the load requires. Here is how such an installation saves you money:

1. Low In Initial Cost. No foundation cost, cuts by half the installation price. Can be transported into the plant on standard material handling equipment, set in place, grouted, bolted down, ready for use in matter of hours!

2. Low in operating cost. The losses when operating a large compressor at light load are very great. On the other hand, the vertical compressors in unit system can be equipped with automatic start and stop control, set at proper pressure ranges, so as to regulate the air output according to load demand. Unit system installations allow you to use one, or as many of the compressors as you need.

3. Low in maintenance cost. The unit system allows you, when one of the compressors is shut down for minor repairs, to continue operating the other compressors without affecting the overall capacity of the plant to any appreciable extent. *For full details write us today.*

SCHRAMM, INC.
The Compressor People
WEST CHESTER • PENNSYLVANIA

SCHRAMM INDUSTRIAL AIR COMPRESSORS

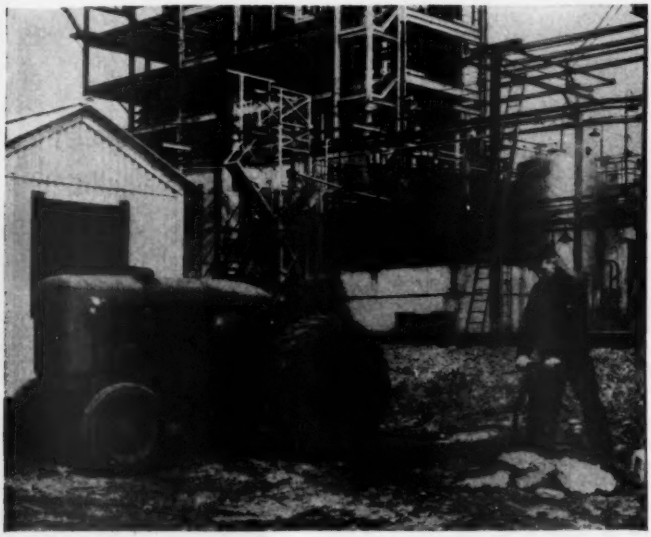
THIS "FACTORY OF THE FUTURE" . . .

ROHM & HAAS selected the SCHRAMM Pneumatractor

For All-Round Industrial Maintenance Use!

TO DO the many maintenance jobs about plants, and to do them at a saving in man-power, your direct answer is the Schramm *Pneumatractor.*

Its uses are varied . . . its advantages many. For instance, in addition to providing air easily and continuously anywhere about the plant, it will PUSH anything a wheel tractor will push . . . PULL anything a wheel tractor will pull . . . and POWER anything a wheel tractor will power.



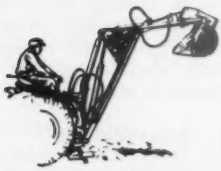
At the same time, it costs less than a separate tractor and a separate compressor.

Strong, rugged, husky, the *Pneumatractor* meets all requirements of today's "Factory Of The Future."

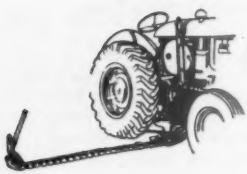
Illustrated are some of the Schramm auxiliary equipment available, showing the varied maintenance uses of the Schramm *Pneumatractor.*

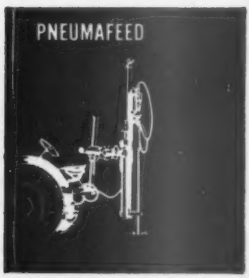
For full details, write us today.

PIPPIN BACK HOE

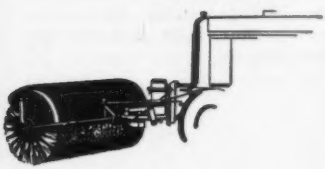


MOWER





ROTARY SWEEPER



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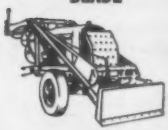
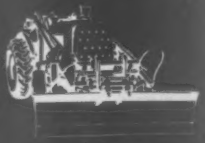
5' BACKFILL BLADE (Mechanical)



SCAFFOLD

FRONT END LOADER (Hydraulic Dump)

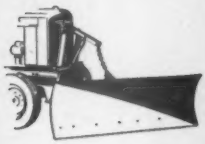
7' BACKFILL BLADE (Hydraulic Angling)



8' BOOM

TOWING TRAILER

SNOW PLOW REVERSIBLE



SNOW PLOW V-TYPE

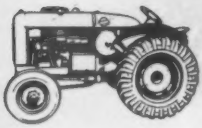
POST HOLE DIGGER

EARTH AUGER

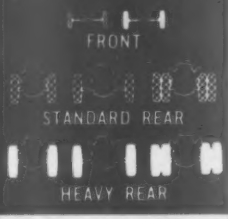
OTTAWA BACK HOE

SNOW BUCKET

HYDRAULIC STEERING



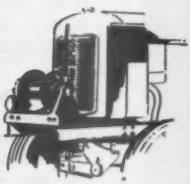
WHEEL ARRANGEMENTS



OPERATORS CAB

REAR WINCH

FRONT WINCH



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FLOORS

22 Floor Gratings
This 12-page catalog shows you features, specifications, and selection charts for the full line of open steel floor gratings. Engineering data. Bulletin RR 254. A. O. Smith Corp.

23 Greaseproof Floors
Greaseproof floors are the subject of this 4-pager. Photographs of installations, specifications, features, and advantages are given. Lists available styles. Bulletin No. 103. Kentile, Inc.

24 Floor Coverings
Three 4-page bulletins on non-skid floor coverings for all types of walkways. Shows some typical installations, lists features, and tells how to install. Bulletin Nos. 258, 501, 503. American Abrasive Metals Co.

25 Greaseproof Flooring
Installation photographs, maintenance information, application data in this 4-page folder tell you about maker's greaseproof flooring. Lists features and available colors. Tile Tex Div., The Flintkote Co.

26 Flooring
Features, comparison tests, and application data are in this 8-page bulletin on maker's flooring. Included are instructions on installation. Bulletin No. 651. Walter Maguire Co., Inc.

27 Floor Cleaning
Equipment for floor cleaning is highlight of this 4-page folder. Gives features of each wax, sealer, and cleanser in the company line, and tells how to apply. Finnell System, Inc.

Turn the page

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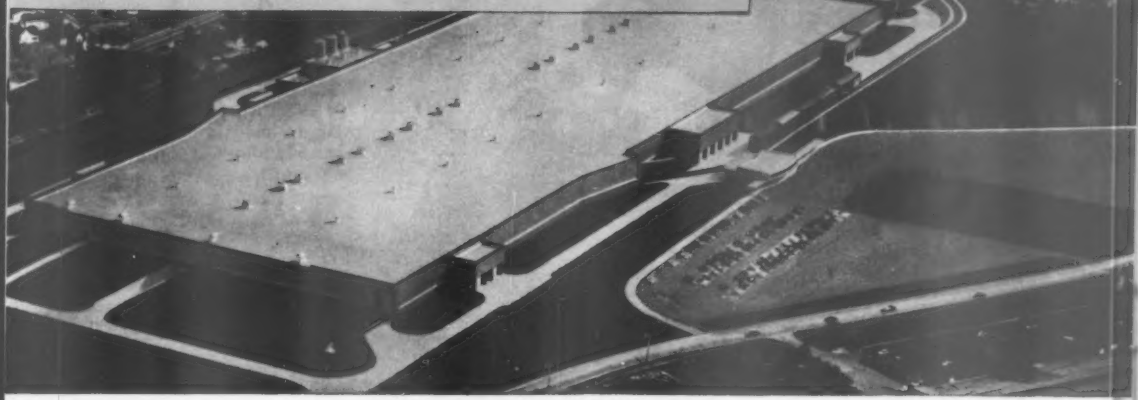
FIBERGLAS* Roof Insulation



It's low in thermal conductance

It's long lasting... It's Economical

JOB DATA ON ANOTHER FIBERGLAS INSULATED ROOF

Building: Lincoln Electric Co. ..... Cleveland

Design and Construction: The Austin Company ..... Cleveland

Year of Completion: 1951

Type of Deck: Steel

Type of Built-up Roof: 4-ply tar and gravel

Insulation: Fiberglas Roof Insulation, approximately 750,000 sq. ft.

OWENS-CORNING FIBERGLAS ROOF INSULATION

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of the Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.

Low Thermal Conductance—When you specify the heat conductance required for roof insulation you make unmistakably clear the degree of heat protection you wish. We'll gladly certify to the low "C" values of Fiberglas Roof Insulation as shown:

Thickness:	½"	¾"	1"	1¼"	1½"	2"
Heat Conductance:	.50	.33	.25	.20	.17	.13

Long Lasting—Will not rot or decay, swell or shrink—fibers of glass are unharmed by possible dampness. Will not deteriorate from exposure to either the elements or normal roof traffic. Durability and low maintenance costs are assured.

Competitively Priced—For equal heat resistance its cost, installed, usually equals and in some instances runs below the comparable cost of less durable roof insulations. Light in weight, easy to cut and handle, it is rapidly installed by standard methods.

With rapid installation and conservation of fuel again gaining in importance, you can specify Fiberglas Roof Insulation with confidence. For complete information write for "The Design of Insulated Roofs" (a 36-page manual) or refer to Sweet's Files—Architectural.

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KENNEDY

bronze globe valves...

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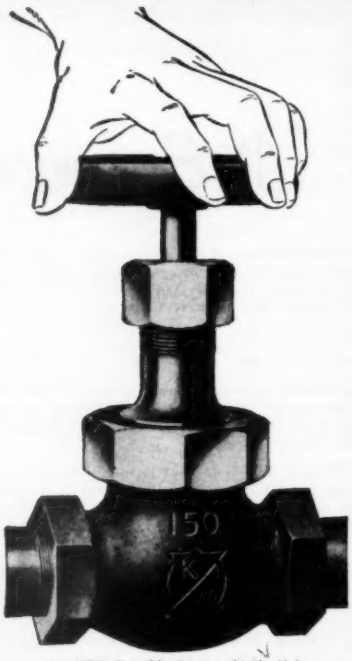
SLIP-ON DISC HOLDER—This unique disc holder locks on securely with stem in wide-open position . . . yet releases by a half-turn of the stem when bonnet assembly is removed.

for longer service, easier maintenance



KENNEDY Fig. 89, Bronze Globe Valve 150 lbs. steam, 300 lbs. WOG, non-shock

YOU KEEP MAINTENANCE COSTS DOWN with KENNEDY Bronze Valves because they are *job-fitted*—every valve specially designed and engineered for the job it has to do.

THE KENNEDY FIG. 89, for example, is designed for services where frequent inspection, cleaning of internal parts and quick renewal of the composition disc are required.

HEAVY UNION BONNET RING permits easy dismantling and reassembly of the valve without risk of damage to body-bonnet bearing surfaces.

RENEWABLE COMPOSITION DISCS are available in a variety of materials to meet a wide range of fluid, pressure and temperature requirements.

RUGGED BODY has an unusually high seat to prolong disc life by utilizing full thickness of disc before disc-holder strikes the base of the raised seat.

LONG-WEARING PACKING—molded rings of lubricated asbestos—maintains easy operation and tight seal to prevent leaks. Valve can be repacked under pressure.

FOR BEST RESULTS and real economy, standardize on KENNEDY Bronze Valves . . . and the complete line of KENNEDY Iron Valves, Malleable, Cast-Iron and Bronze Pipe Fittings.

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28 Underlayments
Features and how-to-do-it data for mastic flooring underlayments are in this 4-page folder. Lists advantages, materials needed for both rubber and asphalt-based types. Catalog No. I-F-12. The Flintkote Co.

29 Floor Binder
Folder describes features and applications of maker's floor mastic binder. Tells how to use it, gives installation photographs. Bulletin No. B-11-B. American Bitumuls & Asphalt Co.

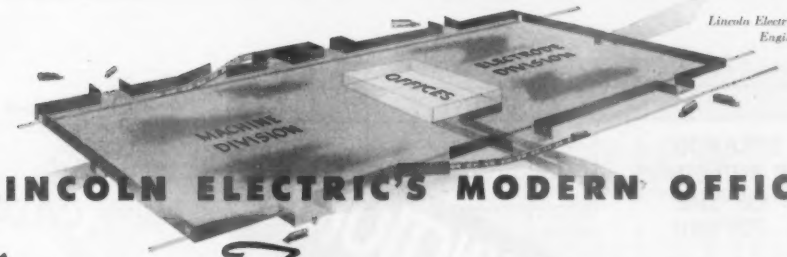
30 Floor Finishes
"Mr. Higby Learned About Floor Safety" is the title of this 16-page booklet. Tells how floor maintenance can save money, gives case studies as evidence. Walter G. Legge Co., Inc.

31 Floor Finishes
This 16-page catalog shows you how floor finishes, sealers, and enamels are made, and how you can use them best. Selection charts and specifications. Section on auxiliary equipment. Form 12-B. Continental Car-Na-Var Corp.

32 Concrete Floors
A 24-page catalog (No. S-8) explains fundamentals of concrete mixing and applications of concrete for industrial floors. Picture sequence shows correct procedure in concrete floor finish construction. Portland Cement Assn.

33 Open Steel Flooring
Structural details, specifications, illustrations, and installation photos describe maker's open steel flooring, and tell what it can do. Safe load tables, section on safety steps. 16 pages. Bulletin No. 1103. The Tri-Lok Co.

Turn the page



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Engineers and Builders:
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Lincoln Electric Company's new 20-acre plant is designed for maximum efficiency in every area, for office as well as production operations. All offices are located in the center of the factory building, with the president's office. *No. 1 in floor plan and pictured at left*, in the exact center of everything, surrounded by key personnel.

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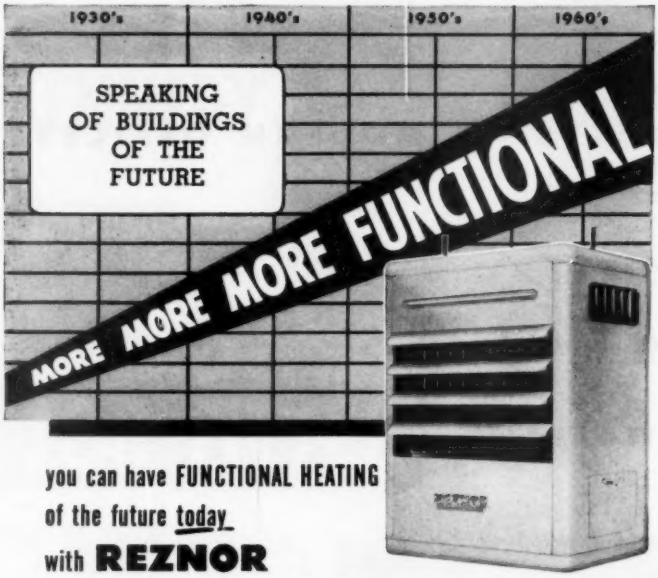

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Reznors are installed at points-of-use; take a minimum of "out-of-the-way" space. By all standards they produce and distribute heat with highest efficiency. Installations require only hanging and connection of utilities and flue. Future rearranging is economical.

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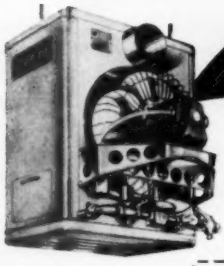

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DOORS & WINDOWS

34 Rolling Doors
Here's a 16-page catalog that features rolling steel doors to fit various space requirements. Operation information, features, details, and illustrations for each type. Catalog No. G-52. The R. C. Mahon Co.

35 Rolling Doors
You learn how you can use rolling doors from this 12-page bulletin. Gives recommended uses, setup, operating information, and specifications for each type. Sections on sliding grilles, rolling partitions. Bulletin No. BB-29. Cornell Iron Works, Inc.

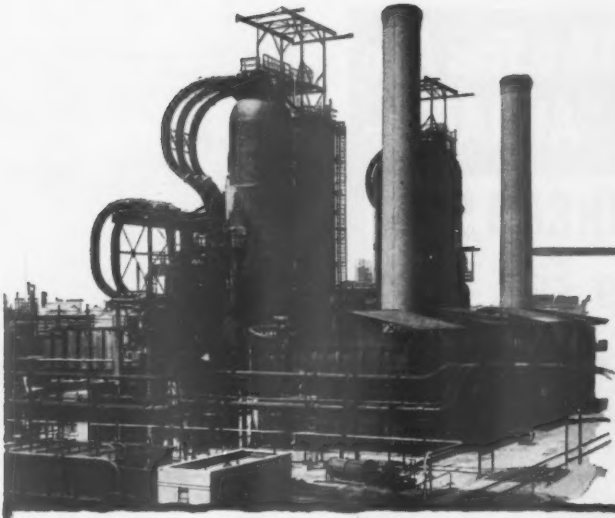
36 Construction Glass
Applications, selection data, and specifications for each type of maker's glass. Lists features and advantages, and includes glazing instructions. 24 pages. Catalog No. SA-52. Libbey-Owens-Ford Glass Co.

37 Glass
12-page catalog describes and illustrates heat-absorbing glass. Tells how you can use it, and shows actual installations. Specifications and general information. Catalog No. 25M, 1-51. Mississippi Glass Co.

38 Translucent Panels
This 4-page folder spotlights maker's functional translucent panels. Specs, available sizes, and engineering data are given. Gives advantages and tells how to install. The Presstite Engineering Co.

39 Windows
Bulletin on industrial steel windows describes three types, with structural details, specifica-

Turn to page B-138



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keeping process and steam lines operating at lowest cost

Refinery men demand *quality* insulation for processing operations. It's needed to keep fluids at constant temperatures. Helps cut fuel waste.

Since 1929, Carey insulation has been in continuous service at the Port Arthur, Texas plant of the Gulf Oil Corporation. Over the years, it has proven itself equal to the punishing strains of vibration and rapid expansion and contraction of equipment encountered in refinery operations . . . while guarding against heat loss, holding the line on costs!

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Whether your problem is one of insulating "straight runs" or complicated shapes, a Carey Industrial Sales Engineer can show you why Carey insulation is best for the job. He'll gladly furnish you with complete technical and application data. No obligation to you. Telephone, wire or write our nearest office today.

Another Carey product—Careystone Corrugated Asbestos-Cement Roofing and Siding—protects Gulf Oil Corporation's warehouse at Port Arthur, Texas. This material is absolutely impervious to corrosion, rust, rot, decay; never requires painting or preservative treatment; is virtually maintenance-free!

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40% of the *biggest* fires in a single year showed lack of fire-door protection as contributing to the heavy losses.*

You get *positive, automatic, dependable* fire protection at doorways and windows with *Akbar* Fire Doors. They're *pushed* downward by a strong spring . . . *controlled* in downward speed . . . and operable *after* closure, for emergency use.

These efficient doors remain coiled out of the way, overhead, when not in use, but lower *automatically*, with speed, efficiency and *safety*, when fire threatens. They combat fire loss by cutting off drafts, blocking flames, and confining fire to small areas.

Approved and labeled by Underwriters' Laboratories, they have saved as much as 33% of their cost *annually*, in reduced insurance rates. Built to fit windows, doorways or other openings of any size.

"Akbar" Doors can also be equipped for daily service use, with or without motor operation. But standard (non-labeled) Kinnear Rolling Doors are preferred for service use where extra fire protection is not needed.

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SAVING WAYS IN DOORWAYS — KINNEAR ROLLING DOORS

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tions, and sketches. Selection charts. 8 pages. Catalog No. IND-4. Detroit Steel Products Co.

40 Insect Screens & Doors
If you need custom-built insect screens and doors, this 24-page catalog may interest you. Design and construction details plus full spec sheets tell the story. Kane Mfg. Co.

MECHANICAL EQUIPMENT

41 Hand Pumps
Eight available models of high-vacuum hand pumps are shown in this 4-page folder. Applications and features included, with photographs. Tokheim Oil Tank & Pump Co.

42 Rotary Pumps
8-page catalog shows a full line of rotary pumps, pressures up to 1000 psi. Gives construction features, size and capacity tables, dimensions. Catalog No. 951. Geo. D. Roper Corp.

43 Sump Pumps
Features, section drawings, specs, and typical installations tell you about sump pumps. Horsepower recommendation charts, accessories list, and useful tables. 8 pages. Bulletin No. 4600A. The Deming Co.

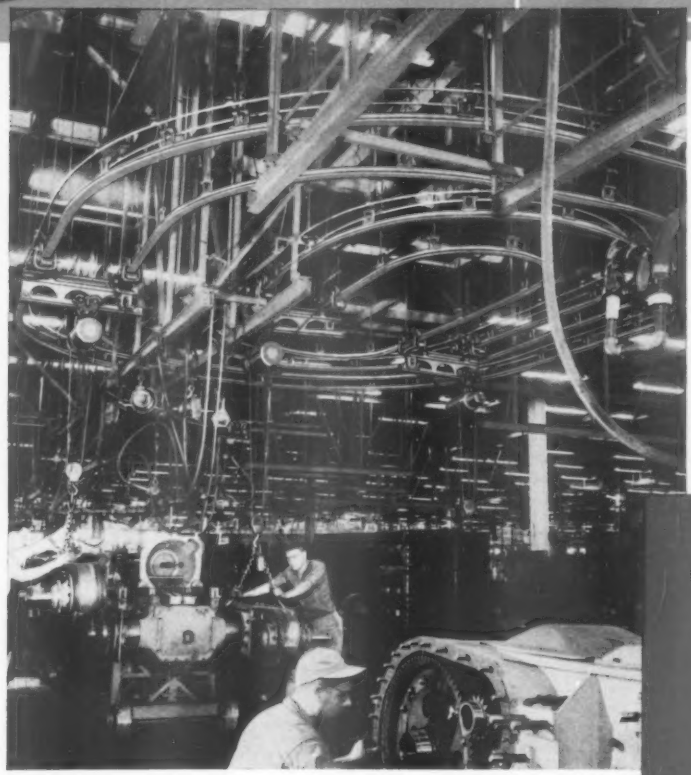
44 Pumps, Compressors
This 24-page catalog gives information to help you select and use pumps and compressors. Capacity charts, engineering data, useful formulas and tables. Catalog No. WP-1090-B52. Worthington Pump & Machinery Co.

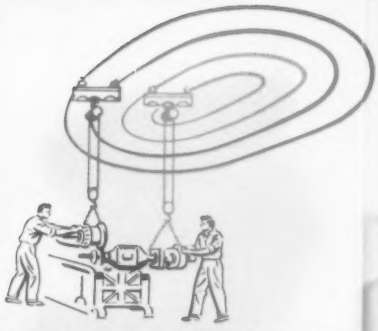
45 Pumps
Two catalogs here: One is a 32-page installation, operation,

CLEVELAND TRAMRAIL

THE OVERHEAD TRACK TO

Lower Production Costs





Short-span hand-propelled cranes with electric hoists on two oval-shaped runways, handling sub-assemblies of tandem drive housings onto graders on Motor Grader Assembly Line. One oval crane serves left side ■ and the other serves right side ■ of assembly line. The cranes bring the parts from a sub-assembly line and support them while being mounted into position.

Around and Around They go...

TO SPEED CATERPILLAR'S PRODUCTION

HAVE you ever considered oval runways for speeding production? Or have you ever thought of the advantages of a double-girder transfer bridge which permits not only a trolley but a complete bridge to be transferred? Ingenious applications such as these, as well as hundreds of standard transfer bridges, cranes and hoists are cutting costs in the vast 400-acre plant of Caterpillar Tractor Co., Peoria, Illinois. This equipment is the result of concentrated effort on materials handling.

For over 25 years Engineers of Caterpillar Tractor and Cleveland Tramrail have sought out materials handling inefficiencies and worked together in developing methods of improvement. Such team work, plus specialized materials handling experience and ingenuity, has been an important factor in establishing Caterpillar as one of America's industrial leaders.

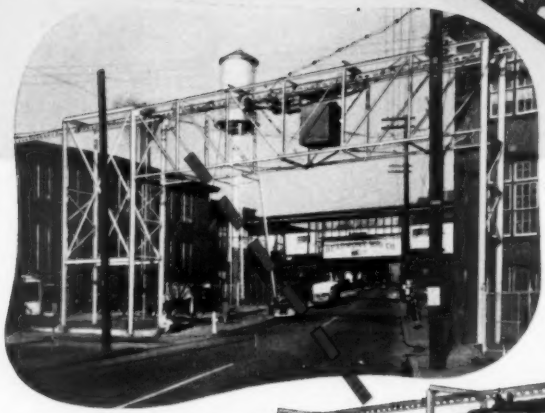
Like Caterpillar and thousands of other concerns, large and small, your company most likely can profit handsomely from Cleveland Tramrail's materials handling know-how. Why not investigate what can be done for you?

GET THIS BOOK—Write for a free copy of Book 2008. Packed with valuable information, this well-illustrated book starts you thinking of ways you can step up production and lower costs in your plant.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3294 EAST 284th ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL

THE OVERHEAD TRACK TO
Lower Production Costs



Automatic dispatch system over main highway.

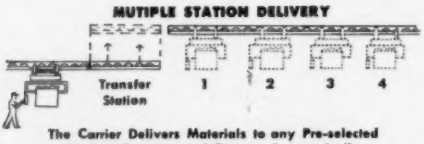
Utilizing the roof for automatic materials handling.

Delivers Materials *Automatically*

Across the Street... ...Over Roof Tops

Automatic Dispatch Systems enable the delivery of materials to one or several points on the same elevation or other elevations, or between buildings without operator accompanying the carrier. An attendant may or may not be at the receiving end depending upon conditions involved.

SINGLE STATION DELIVERY
The Carrier Travels Automatically Without Operator Accompanying
1st Man Loads and Starts Carrier
2nd Man Unloads and Returns Carrier



The Carrier Delivers Materials to any Pre-selected Station, Empties, and Returns Automatically

LOAD a Tramrail van, set the station selector, press a push button and material is on its way. When it reaches its destination, the van stops automatically. After it has been unloaded and reloaded, depressing a button returns it to the starting point or any other station as selected. This is one type of Cleveland Tramrail automatic dispatch system. Other types unload and return automatically or perform other tasks without need of usual accompanying operator.

Automatic dispatch equipment can be operated indoors or outdoors, under ceilings, over roof tops, across streets, between buildings or departments and from one elevation to another. Space otherwise wasted can be utilized for efficient, low-cost materials handling. Widely separated operations can be integrated and carried out as though adjacently located.

Many Cleveland Tramrail automatic dispatch systems are serving the metalworking, rubber, textile, glass, and other industries. Why not learn about this ultra modern way of handling now?

***GET THIS BOOK**—Write for a free copy of Book 2008. Packed with valuable information, this well-illustrated book starts you thinking of ways you can step up production and lower costs in your plant*

CLEVELAND TRAMRAIL DIVISION
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and repair manual for centrifugal pumps. The other is a 6-page folder that describes general purpose pumps, with cutaway drawings and specifications. Catalog Nos. 08X7613 and 52B6351B. Allis-Chalmers Mfg. Co.

46 Pumps, Turbines
Two catalogs: One 26-pager describes, gives features of single-stage centrifugal pumps. Second catalog, 22 pages, helps you select turbines from maker's line. Catalog Nos. 83-29R, 4200-A. De Laval Steam Turbine Co.

47 Vacuum Pumps
Here's a 12-pager on cycloidal vacuum pumps. Operating information, characteristic charts, installation photographs, and application data. General specifications included. Catalog No. 50-B-13. Roots-Connersville Blower Corp.

48 Gears and Reducers
Describes a full line of gears and reducers, with sections showing what's available and how to select it. Horsepower data charts and engineering tables. 126 pages. Cat. No. 50 The Ohio Gear Co.

49 Air Compressors
You get 24 pages on line of air compressors in this catalog. Features listed, and selection information given. Section drawings, specs, and parts descriptions spotlight the product. Catalog No 35. Brunner Mfg. Co.

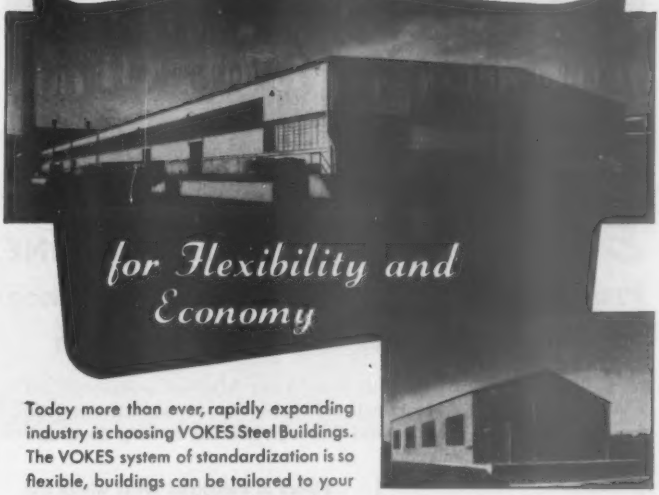
50 Vibration Control
A 4-page folder tells advantages of controlling vibration, describes features of maker's product. Specifications and illustrations, with isolation selector chart to give you company's recommendations. Catalog No. G-104. The Korfund Co., Inc.

51 Vibration Control
"How to Reduce Vibration" is the title of this 16-page catalog. Tells about felt products, what they can do, and how to select and install them Cost data included. American Felt Co.

Turn the page

VOKES BUILDINGS

Prefabricated STANDARD STEEL BUILDINGS



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Today more than ever, rapidly expanding industry is choosing VOKES Steel Buildings. The VOKES system of standardization is so flexible, buildings can be tailored to your exact requirements, without the usual time consuming delays. Time to occupancy is cut to DAYS instead of months. Flexibility enables you to combine sections in innumerable ways to meet any building problem.

VOKES buildings may be erected in any length and width in multiples of two feet, and any height. Unlimited length and width spans afford working space uninterrupted by columns. Vertical sidewalls assure more usable space at lower cost per square foot.

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A Permanent Building - - - With Prefabricated Advantages

The **H. L. VOKES** *Company*

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Explosion Proof FLOOR MACHINE

Provides Mechanical Floor Maintenance Without Danger of Fire or Explosion

The Multi-Clean Explosion Proof Floor Machine is designed for use on all types of floors in industries where the top requisite of good housekeeping is systematic and thorough cleaning to keep floors free of dangerous accumulations.

THE MULTI-CLEAN METHOD BRINGS LONGER LIFE TO ALL FLOORS

All floors—wood, concrete, quarry tile, terrazzo, asphalt, rubber composition or any other type will wear longer, look better and be safer when maintained by The Multi-Clean Method . . . the approved floor care method employing Multi-Clean tested floor liquids and equipment.

Floors in industrial areas where the danger of fire or explosion from airborne fumes or dust previously limited operations to slow and expensive hand labor now can be cleaned and maintained safely, efficiently and economically with the Multi-Clean Explosion Proof Floor Machine. Scrubbing, cleaning, buffing or polishing is accomplished quickly and safely, eliminating slip and fire hazards caused from grease, chemicals or other dangerous materials.

FREE! **FLOOR MAINTENANCE MANUALS**

To help you solve your floor maintenance problems. Handy reference file size, each manual deals with a specific floor and its proper care. Check those wanted in coupon below.

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Gentlemen: Send more information on the Multi-Clean Explosion Proof Floor Machine and the maintenance manuals which I have checked.

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Name.....
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Custom Cleaning Chemicals • Floor and Rug Machines • Permanent Floor Finishes • Industrial Vacuums

Use the coupon on page B-124 or B-176 to get these important . . .

Free NEW CATALOGS

Begins on page B-124

52 Pulverizes, Collectors
Features of a full line of pulverizers, atomizers, and collectors in this 50-page catalog. Selection charts tell how you can use the products, and photographs illustrate. Pulverizing Machinery Co.

53 Compressors
Three bulletins on air compressors are offered in this 20-page package. Included are product illustrations, features, specifications, dimension drawings, and typical installation sketch. Bulletin Nos. GC-52, 5110, and SSB-51. Schramm, Inc.

PAINTS & COATINGS

54 Protective Coatings
Folder on a bituminous roof coating tells you about its features, application, and installation. Section on equipment used with it. 4 pages. Bulletin No. B-13. The American Bitumuls & Asphalt Co.

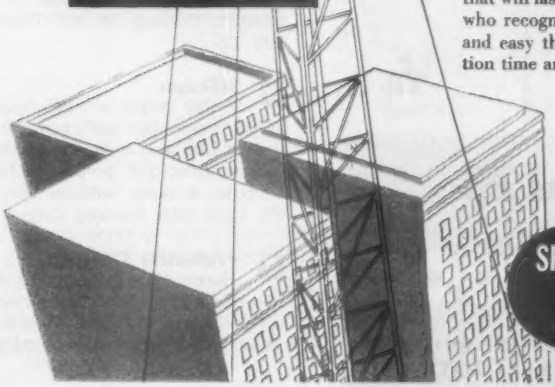
55 Paint
Non-slip paint: Maker shows with words and pictures how you can use it and what colors are available. Lists features and typical applications. Bulletin No. NSP-52. Oil-Dri Corp. of America.

56 Paint Spray Compressors
Catalog to help you select compressors and spray painting equipment from maker's line. You get cutaway drawings, selection charts, installation recommendations. 52 pages. Catalog No. K-262-P. American Brake Shoe Co.

57 Coatings, Adhesives, Sealers
Here are spec charts and application information to simplify

It's the Southeast's finest Radio-Television Building

...and another **SPANG CW** installation



Completely air conditioned, fire-resistant and insulated against sound, this modern, new building for Station WAGA, Atlanta, is an unusually well-designed radio-television center.

Incorporated are the very latest advanced ideas for AM, FM and TV broadcasting, including new technical features, a wide variety of studios, even a darkroom. And—*because absolute reliability was so important for heating and air conditioning*—Spang Pipe in sizes from ¾" to 3" was specified for these services.

Always uniform in every respect, *quality-controlled* Spang Steel Pipe is consistently the first choice of careful architects, engineers and owners who are looking for pipe that will last longer. First choice, too, of smart contractors who recognize how much the easy cutting, easy bending and easy threading characteristics can cut their installation time and costs.

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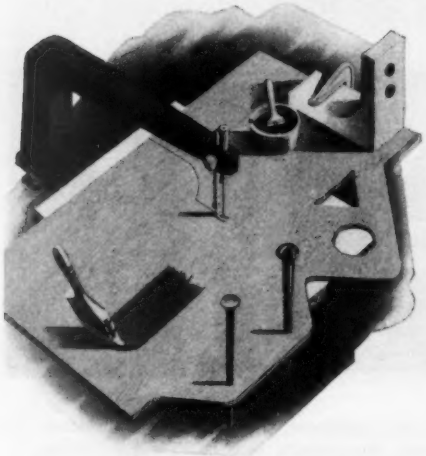
Only plywood gives you all 6

WORKABILITY

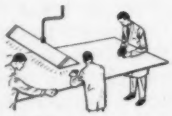


1 Workability

2 Cross Laminated Strength

3 Attractive Appearance

4 Large Panel Size



5 Tested Quality

6 Light Weight

FAST fabrication and easy workability come naturally to Douglas fir plywood. These cross-laminated real wood sheets can be worked or machined to *any* shape. It can be sawn, planed, finished like ordinary wood . . . but *unlike* ordinary wood, plywood can be fastened close to the edge without splitting . . . jigged to indicated shapes, bent, drilled. Won't shatter, split or puncture. May be machined to the hairbreadth tolerances required in pattern making, yet it works with ordinary tools.

Workability is but one of many advantages which make plywood the standout choice for hundreds of construction, manufacturing and maintenance jobs. Douglas Fir Plywood Association, Tacoma 2, Washington.

Douglas fir plywood is real wood, made by "unwinding" giant logs

into thin wood sheets which are inseparably cross-laminated

to form large, light panels having beauty and great strength

Douglas Fir Plywood

AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

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NEW Free CATALOGS

Begins on page B-124

selection from line of coatings, adhesives, and sealers. 26 pages. Bulletin No. Z-ADB. Minnesota Mining & Mfg. Co.

58 Paint
"Your Next Paint Job" is the title of this 32-page booklet. It tells you how to get the most out of maker's paint, offers color selection and paint spraying suggestions. Tremco Mfg. Co.

59 Paint
An 8-page folder tells how you can build eye comfort into your plant by using color harmony schemes. Also includes a section on protective coatings. Truscon Laboratories.

60 Paint
Booklet on color dynamics gives you 36 pages on the results of proper color use by industry. Helps you select right type and color of paint for your needs. Form ADV 225. Pittsburgh Plate Glass Co.

61 Spray Painting Equipment
If you use spray painting equipment, this 92-page catalog should interest you. Product illustrations, features, and specifications for each item in the line. Indexed. Catalog No. 955. Binks Mfg. Co.

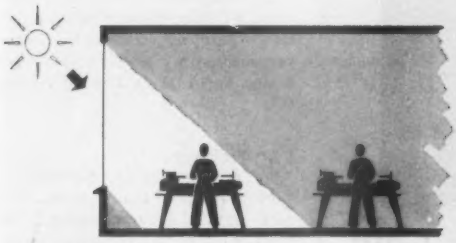
62 Silicones
Folder serves as a reference guide to manufacturer's complete line of silicones. Includes specifications, uses, and properties for all types. 4 pages. Indexed. Form No. GC3. Dow Corning Corp.

63 Protective Coatings
Here's a 16-page catalog to describe a line of heat- and chemical-resistant coatings. Quick-reading selection chart and ques-

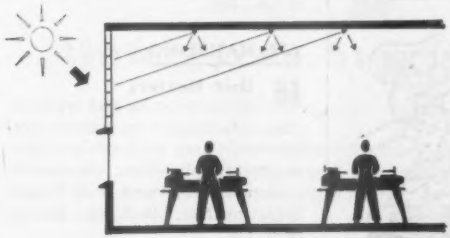
FACTS YOU SHOULD KNOW ABOUT

daylighting your buildings

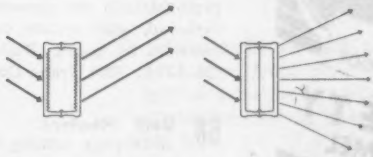
WITH PITTSBURGH CORNING GLASS BLOCKS



QUESTION . . . How can we achieve the control of daylight over wider working areas in our offices and shops?



ANSWER . . . PC Functional Glass Blocks are especially designed to direct or diffuse natural daylight, so that it may be properly controlled for maximum illumination, with comfort. This diagram shows how a room is "daylighted" with PC light-directing glass blocks.



TWO TYPES of PC Functional Glass Blocks are available—light-directing and light-diffusing.

Wherever good daylighting is demanded — in offices, factories, plants, laboratories, public buildings —PC Functional Glass Blocks promote efficiency, reduce eye fatigue, guard workers' well-being.

For, in addition to many purely decorative patterns, PC Glass Blocks are available in *functional* patterns that specifically *direct* or *diffuse* daylight. With PC *Functional* Glass Blocks, the most exacting daylight control and distribution needs can be met without shading. These functional patterns include two principal types. One type controls light by *bending* or *directing* it upward. The other type by *diffusing* it. The light-directing glass blocks, installed above eye level, have internal prisms that project incident daylight above the field of vision and thus distribute illumination with remarkable uniformity throughout the room. The light-diffusing glass blocks break up harsh rays and flood interiors with softly diffused light of high quality.

Our specialists will be glad to consult with you on any problem involving the daylighting of your buildings. Ask for their help. There's no obligation.

Other Facts: PC Glass Blocks cut maintenance costs; assure privacy; eliminate outside noises and distracting views; stop infiltration of dust and grit; reduce cleaning expense; cut heating and air-conditioning costs; are immediately available.

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Please send me a copy of your FREE booklet, "The Mark of a Modern Building—PC Glass Blocks."

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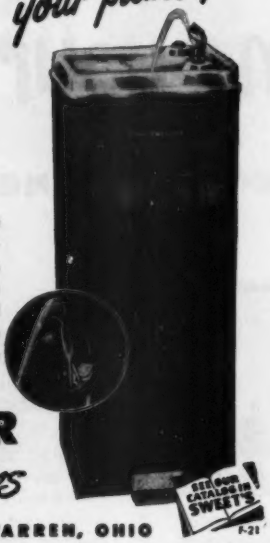
PITTSBURGH PC CORNING

PITTSBURGH CORNING CORPORATION . . PITTSBURGH 22, PENNSYLVANIA

PLAN NOW... FOR HEALTH SAFETY *throughout your plant!*



Safety is the prime requisite for your workers in plant or office. On that depends continuous production. The installation of Halsey Taylor Coolers and Fountains throughout plant and offices means an abundant supply of contamination-proof cool water at all times, regardless of pressure variation and with minimum cost! Why not investigate the Halsey Taylor line?

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Fountains and Coolers

THE HALSEY W. TAYLOR CO. WARREN, OHIO

GUARANTEE SAFE PASSAGE WITH Convoy SAFETY ENAMEL

JUST BRUSH CONVOY ON DANGEROUS SURFACES

Easy to apply; brushes on like paint.

Abrasive always stays in suspension because Convoy is homogenized.

Wears indefinitely; heavy traffic is on the abrasive which protects enamel.

TRY CONVOY FREE. Make your own test. Just ask for one or more trial gallons. If you aren't completely satisfied, simply return the unused portion within 30 days and you will receive full credit on the entire order.

CONVOY COMES IN 5 COLORS
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Free NEW CATALOGS

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tion-and-answer section. Directions for use included. Form 251. Rust-Oleum Corp.

64 Spray Painting Equipment
You'll find features, selection information, and specifications in this 48-page catalog on spray painting equipment. Compressors, spray guns, and accessories. Form D1-B. The De Vilbiss Co.

65 Finishes
You get a photo demonstration of maker's maintenance finishes in this 23-page catalog. Lists features and specifications, suggests applications. Catalog No. A-62-a. E. I. duPont de Nemours & Co., Inc.

AIR HANDLING

66 Unit Heaters
How-it-works and what-it-does information on maker's unit heaters. Gives performance data, suggests applications, lists specifications and features. Two 8-page bulletins: Nos. 149-A, 651. Modine Mfg. Co.

67 Unit Heaters
Operating data, selection information, and details on a line of unit heaters. Specifications, piping details, and capacity charts included, with section on heater location. 54 pages. Bulletin No. DS-327A. The Trane Co.

68 Unit Heaters
A 16-page catalog tells you the features of revolving unit heaters. Typical details, installation planning section, full specifications, and engineering data tables. Bulletin No. HR-6. L. J. Wing Mfg. Co.

Turn the page

How Fires Start . . .

Carelessness

Top-of-the-list cause of fires, according to study after study, turns out to be just plain human carelessness.

Under the heading "Careless smoking habits" you'll find such oddities as the waitress who cleaned *hot* ash trays with napkins destined for the laundry chute, and the mechanic who tossed a match into a puddle of gasoline. But far, far more frequently it's simply the ordinary guy who unthinkingly tosses away a lighted match.

How Fires Are Stopped . . .

Grinnell Sprinklers

Education does a world of good to prevent fires from *starting*. But until human behavior is perfect, your best protection lies in *automatic control* of fire.

The surest control is with Grinnell Automatic Sprinkler Systems, which check fire at its source, wherever and whenever it may strike, with automatic certainty. For more than seventy years fires starting in buildings protected by Grinnell Sprinklers have been extinguished before doing material damage.

Grinnell sprinklers are your assurance of positive, *automatic fire protection.*

GRINNELL FIRE PROTECTION SYSTEMS

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GAS-FIRED UNIT HEATERS for all heating needs

United Vans, one of the largest movers of household effects recently moved themselves into their own modern building. Heating requirements included: comfort for office employees; moderate heat for storage rooms; abundant heat for the large maintenance garage where large doors are frequently opened.

Janitrol Unit Heaters were selected for their low comparative initial cost, ease of installation, proved efficient performance, plus economical completely automatic operation.

Whether for a new building, plant enlargement or remodeling, there are types and sizes of Janitrol Unit Heaters to meet every heating requirement.

WRITE FOR YOUR COPY OF "BUSINESSMAN'S BLUEBOOK OF HEATING"

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OTHER PRODUCTS—'Surface' Industrial Furnaces Kathabar Humidity Control Systems, Aircraft Heaters

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Free NEW CATALOGS

Begins on page B-124

69 Unit Heaters
This 16-page catalog gives principles of operation, installation information, and descriptive material for unit heaters. Parts illustrations. Form No. JS121-090. Surface Combustion Corp.

70 Unit Heaters
Features and applications for maker's gas-fired unit heaters are in this 18-page catalog. Specifications, dimensions, parts illustrations are included. Index. Catalog No. U-50. Reznor Mfg. Co.

71 Unit Heaters
You get features, advantages, and specifications for each model in a full line of unit heaters. Photographs show how they can be used in your plant. Schematic wiring diagrams and dimensions. 24 pages. Catalog No. UH. The Grinnell Co., Inc.

72 Unit Heaters
Catalog describes operation, design, and construction features of unit heaters. Cutaway drawings and photographs show how they operate. Also capacity charts, useful tables. 18 pages. Catalog No. 3322. Herman Nelson Div., American Air Filter Co., Inc.

73 Air Conditioning, Refrigeration
Two catalogs show how refrigeration and air conditioning can boost efficiency in your plant. Illustrations and specifications. 36 and 42 pages. The Carrier Corp.

74 Air Conditioning Equipment
Specs, drawings, installation data are given in this 12-page catalog on air conditioning equipment. Features water coolers,

Turn to page B-150

Greenwich lavatories

PRACTICAL FIXTURES FOR INDUSTRIAL WASHROOMS

Modern industrial plants the country over select Kohler plumbing fixtures and fittings because they insure years of heavy-duty service, economical maintenance—and their appearance and convenience encourage cleanliness.

The St. Louis bakery of Carr-Consolidated Biscuit Company—most recently completed of five—has large washrooms equipped with Kohler lavatories, sinks, service sinks, closets and urinals. The durable, glass-hard surfaces of the fixtures are easy to keep clean and bright. The fittings are chromium-plated, designed and made for easy, positive control of water and efficient waste disposal.

Write for catalog of Kohler plumbing fixtures for industrial and public buildings.

Kohler Co., Kohler, Wisconsin. Established 1873

Architects: Mauren, Russell, Crowell and Mullgardt. Kohler fixtures furnished by Peerless Missouri Company; installed by W. L. Clucas, Inc.

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PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS • AIR-COOLED ENGINES • PRECISION CONTROLS

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SAFETY
MINERAL m.i. INSULATED
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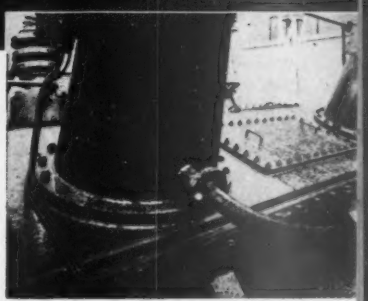
A GENERAL CABLE PRODUCT

Safety m.i. Wiring* in exposed installation on outdoor transformer bank.



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can be hammered, crushed, bent, twisted, jerked —with no impairment of its electrical performance.

Emergency overloads can't hurt it. Age causes no deterioration. It will outlast the structure in which it is installed!

and... ONE STEP INSTALLATION!

No additional mechanical protection required. Safety m.i. Wiring is its own conduit. Available fittings permit installation in one operation, using standard switch and standard junction boxes. Smaller diameter provides reserve space and assures neat appearance...

and... NO VAPOR PASSAGE!

Completely filled with compacted mineral insulation. Necessity for specially installed seals in the cable-run to prevent the passage of combustible gases through a wiring system is wholly unnecessary with Safety m.i. Wiring...

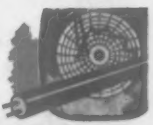
and... COMPLETELY MOISTURE PROOF!

Simple fittings permanently seal both ends of each run of wiring. No possible entrance for moisture. Normal concern over this hazard is thereby completely eliminated...

and... RIGID YET FLEXIBLE!

Thumb-pressure bending, in ordinary sizes, easily fashions orderly wall patterns—conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, it stays put...

and... NO HEAT DETERIORATION!



The mineral insulation is physically stable up to 2800° C., thereby assuring against deterioration by heat, even beyond the melting point (1083° C.) of the copper sheath.

Your General Cable representative is well qualified to discuss the important advantages New Safety m.i. Wiring offers to all industry—for all applications from 0-600 volts. Contact the nearest General Cable office.

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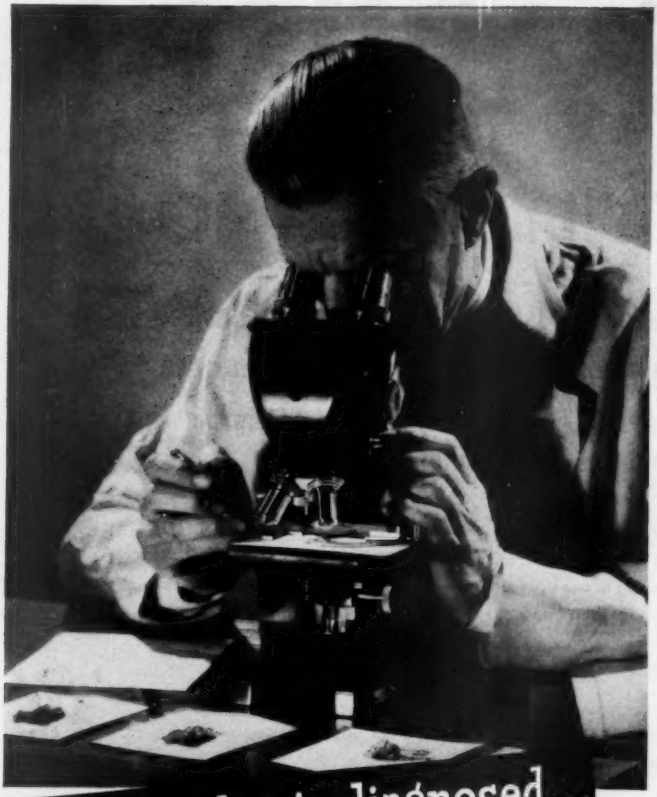

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water chillers. Form No. 2ACA-79-01. Servel, Inc.

75 Air Handling Equipment Here's a 15-page catalog (No. B-5164) to show you a complete line of air conditioning products, air handling apparatus, and air cleaning equipment. Specs. Westinghouse Electric Corp.

76 Air Conditioning Equipment Feature of this 12-pager is central system air conditioning equipment. Included are drawings, charts, estimating data, and suggestions on installation. Catalog No. ACA-3016. Frigidaire.

77 Heat Transfer Products Collection of bulletins—116 pages in all—tells you about maker's heat transfer equipment Gives typical piping connections, sketches, charts, and details as illustration. Young Radiator Co.

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equipment. Charts, illustrations, price lists on water chillers, coolers, coils, receivers, condensers. Acme Industries, Inc.

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82 Dust Control
Manufacturer calls this 36-page catalog (No. 72-B) "Dust and Fume Control." Describes the various sizes and models of cloth-type dust collectors, and lists advantages. American Wheelabrator & Equipment Corp.

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This 24-page catalog shows you the advantages and operating characteristics of company's centrifugal blowers and exhausters. Construction features, actual installation photographs. Catalog No. 120-B-14. Roots-Connersville Blower Corp.

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Get *more* for your money *every* way with the *quality* line of air conditioning equipment—Servel!

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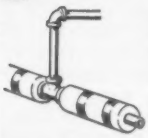

Connect Servel units to your present steam source . . . use gas, oil, LP gas, waste heat or steam at any pressure. With Servel *you* pick the most economical energy source, keep operating costs low!

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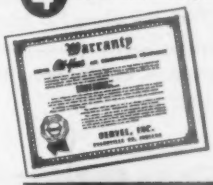
Because there is nothing in the Servel absorption principle refrigerating unit to wear out . . . you get silent, continuous operation, top performance with a bare minimum of maintenance.

3 Custom fitted to do your job best!

Want to air condition a store, office or factory? Need chilled water for processing? Want cooling only . . . or year 'round air conditioning? Servel has the unit or combination to do it best.

SELECT SERVEL . . . the air conditioning that offers low operating cost, guaranteed dependability in residential, commercial or industrial installations.

4 Servels are guaranteed five times as long!



Each Servel refrigeration unit is warranteed for five full years! That is five times as long as all other comparable units. What greater guarantee of long life and dependability can you get?

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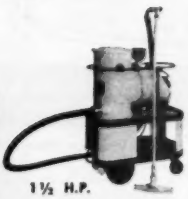
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teristics, and available equipment in maker's line. Specs, features are included. Bulletin Nos. 88, 90. Read Standard Corp.

87 Space Heaters
A 10-page bulletin (No. 523-A) on a line of forced-air space heaters. Tells how you can use them, gives features, details, and specifications. Capacity and dimension tables. Dravo Corp.

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88 Motors
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89 Panelboards
Selection information, and special application suggestions tell you about a full line of panelboards. Gives factors to consider in selection, shows how panelboards can cut costs. 14 pages. Bulletin No. B-5260. Westinghouse Electric Corp.

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Whichever you select—Ferrox, Fera-Mat or Feralun—you can be sure of getting a top-quality, economical safety flooring. Each is first choice of thousands of users. Each is designed to suit particular job requirements. Here are the facts in capsule form:

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The HYDROPEL (top half) part of this block absorbed little of the salt solution in which it was placed until all had evaporated. Air entrained concrete (lower half) sucked up the solution, leaving salt crystals throughout.

HYDROPEL is resistant to chemicals. Subjected to every known test for endurance, HYDROPEL concrete lasts longer because it resists moisture, impact, and chemicals (except acids).

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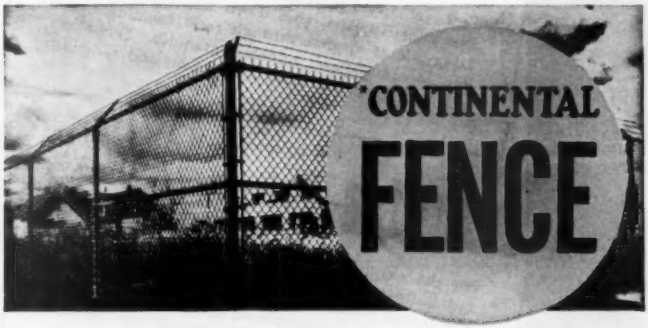

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92 Sound-Powered Phones
Condensed catalog (No. SA-13) shows you how sound-powered phones can help your plant. Application information, installation and price data. 6 pages. The Wheeler Insulated Wire Co., Inc.

93 Phone System
This 4-page folder features plant phone system. Tells you how it's installed, what it can do for you, and what's available. Illustrations and specifications for each. Select-O-Phone Div., Kellogg Switchboard & Supply Co.

MAINTENANCE EQUIPMENT

94 Air Tools
In this 72-page catalog you'll find product information on a complete line of air tools. Available size charts, section on accessories. Also tells how to adapt equipment for special uses. Catalog No. 60. Aro Equipment Corp.

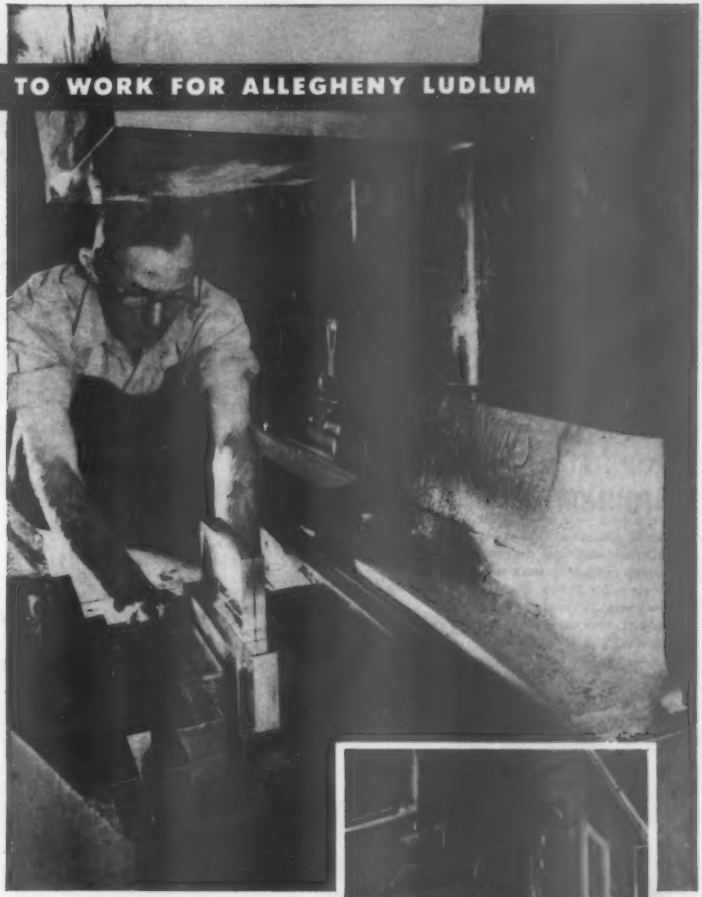
95 Simplex Jacks
A 29-page bulletin (No. 50) offers detailed specifications of each item in a full line of simplex jacks. Application information, illustrations, data on accessories. Templeton, Kenly & Co.

96 Stud Driver
Subject of this 4-page folder is a stud driver that fires the fasteners into materials. Lists features and applications. Price list included. Form No. 939 A. Remington Arms Co., Inc.

97 Wrenches
Professional wrenches get the whole show in this catalog. Specifications, available size list,

Turn to page B-160

PUTTING *Air* TO WORK FOR ALLEGHENY LUDLUM



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*Installation by Mechanical Heat & Cold, Inc., Detroit, Michigan.

Westinghouse equipment parts are designed to work perfectly together, will install in a minimum of space.

Atmospheric conditions in the quality control lab must be constant, matching those in the manufacturing areas.

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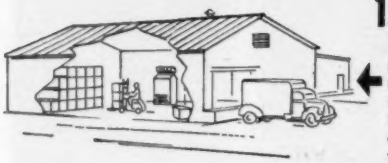

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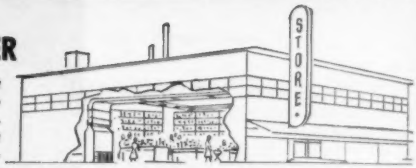
Where space is limited or roof heat losses are unusually high, Dravo Heaters require minimum space . . . no expensive boiler plant; roof heat losses low due to controlled recirculation of air; can be used with or without ducts.



3. SUPERMARKET

In heating, ventilating and air conditioning large areas, Dravo Heaters can tie in with air conditioning system by using same duct work, provide year-'round comfort.

2. FOUNDRY

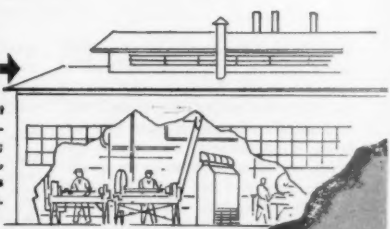
Negative pressures, caused by exhausting foul air, are balanced by tempering fresh outside air with Dravo Heaters. Atmosphere is kept healthy, constant temperatures are maintained, worker efficiency improves.

4. MEDIUM-TEMPERATURE CURING

In controlling temperatures and air moisture content in process manufacturing, Dravo Heaters have automatic controls, maintain constant temperature, can recirculate air to control curing process.

5. MACHINE SHOP

For comfort heating large plant areas, Dravo Heaters have maximum air throw in all directions; can be turned off during idle time, warm up quickly, keep fuel costs low, can heat 4,000 to 20,000 sq. ft. area, no duct work required.



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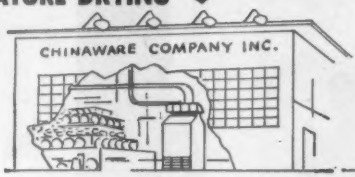
ACCEPTANCE BY FACTORY MUTUAL ENGINEERING DIVISION OF DRAVO STANDARDIZED SAFETY CONTROL CIRCUIT.

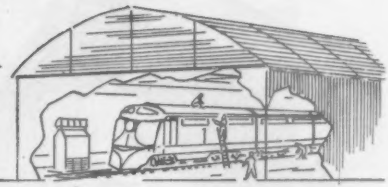
HEATERS.....

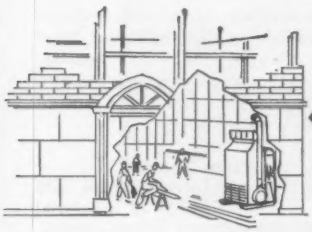
8 DIFFERENT HEATING PROBLEMS!

6. MEDIUM-TEMPERATURE DRYING

In removing moisture in drying operations, Dravo Heaters provide low-cost heat at even, predetermined temperatures; are automatic in operation, can use gas or oil, are readily converted.







7. TEMPORARY HEATING

For building construction projects where ground temperature must be kept above freezing, Dravo Heaters are quickly installed, easily moved to any location; can be later used as permanent heating plant for the new building.

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In providing ample heat for repairmen in large buildings, Dravo Heaters keep heat where it's needed . . . at the working level; directional nozzles easily adjusted to suit conditions; heaters can be mounted on walls or hung from ceiling in any position.

DRAVO *Counterflo* HEATERS CAN SOLVE SIMILAR PROBLEMS IN THESE INSTALLATIONS, TOO

Comfort Heating and Ventilating in schools, churches, auditoriums, laundries, restaurants, garages, factories.

Process Drying of wood, rubber and paint; rug drying; auto laundry operations.

Process Curing of concrete pipe linings, farm crops, paper and fibres.

DRAVO HEATERS OFFER YOU . . .

- Low initial cost—users report 30% to 60% savings.
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- Low fuel cost—direct-fired . . . burn gas or oil . . . units readily converted.
- Automatic operation—on-off or modulating controls.
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features, and complete product index. Charts included. 40-pages. Form No. 1102. Blackhawk Mfg. Co.

98 Drill
This 4-page folder shows you a hand drill for shop or maintenance work. Lists features, suggests applications, and gives specifications. Section on auxiliary tools, available sizes. Bulletin No. HD-649. Cleco Div., Reed Roller Bit Co.

99 Machine Tools
Features and operating data on a complete line of industrial machine tools are in this catalog. It's fully indexed, gives specifications, parts and price lists. 64 pages. Catalog No. AB-51. Delta Power Tool Div., Rockwell Mfg. Co.

100 Maintenance Manual
This pocket-size book of safety rules and hints can help keep your maintenance personnel out of the sick bay. Lists general standards of maintenance, and rules for various types of work, and tells how to care for and use equipment. 56 pages. Catalog No. 25E7524. Allis-Chalmers Mfg. Co.

101 Industrial Oils
An 18-page booklet gives features and applications of industrial oils in the plant. Physical property tables and selection charts. Bulletin No. AD 4078. Standard Oil Co. (Ind.)

102 Hard-Facing Alloys
You get information on selecting and using hard facing alloys in this 16-page bulletin (No. 5651). Lists properties, suggests applications, and useful tables give requirements for various equipment. Alloy Rods Co.

Turn the page

CORRUGATED *Asbestos* TRANSITE*

For Exteriors

In this recently built plant, Johns-Manville Corrugated Transite is used effectively to provide utility and an attractive streamlined appearance.

For Interiors

In this modern retail shop, the deep shadow lines of Johns-Manville Corrugated Transite heighten the beauty of this striking interior.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof, needs no paint or special treatment to preserve it, and can be salvaged and reused if necessary.

Today, Corrugated Asbestos Transite is also used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. CE, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Canada.

*Reg. U. S. Pat. Off.

EASY TO FASTEN TO STEEL

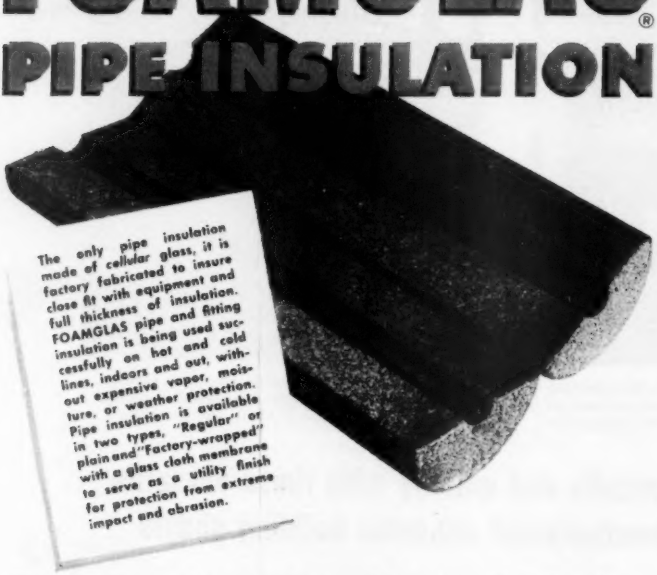
EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

JM Johns-Manville *Asbestos* CORRUGATED TRANSITE

THIS IS FOAMGLAS® PIPE INSULATION


The only pipe insulation made of cellular glass, it is factory fabricated to insure close fit with equipment and full thickness of insulation. FOAMGLAS pipe and fitting insulation is being used successfully on hot and cold lines, indoors and out, without expensive vapor, moisture, or weather protection. Pipe insulation is available in two types, "Regular" or plain and "Factory-wrapped" with a glass cloth membrane to serve as a utility finish for protection from extreme impact and abrasion.

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FOAMGLAS is not a fiber, a batt, a blanket, wool or board. It contains no granular or organic material. It is composed entirely of still air sealed in millions of minute glass cells.

FOAMGLAS eliminates the need for extra moisture and vapor barriers. It is practically impervious to fumes, chemicals and other elements, therefore *retains* its original insulating efficiency throughout exceptionally long service.

FOAMGLAS is an effective barrier to heat flow. It helps maintain predetermined temperatures. It is being used successfully in many and varied high and low temperature applications on pipe lines and process equipment.

FOAMGLAS is light, strong, rigid, durable. It cannot burn. Insects and vermin cannot nest in it, eat into or through it. FOAMGLAS needs no special type weatherproofing when used outdoors.

Pittsburgh Corning Corporation
Dept. N-42, 307 Fourth Avenue, Pittsburgh 22, Pa.

Please send me without obligation a sample of FOAMGLAS and your FREE booklets on the use of FOAMGLAS for: Normal Temperature Commercial, Industrial and Public Buildings ☐ Refrigerated Structures ☐ Piping and Process Equipment ☐.

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Free NEW CATALOGS

Begins on page B-124

103 Welding Equipment
A full line of arc welding equipment is shown in this 12-page catalog. There are specifications, photographs, electrode selection charts, and accessory lists. Bulletin No. 1309. Lincoln Electric Co.

104 Production Welders
In this 16-page bulletin (No. W-128) production welders get the whole show. Features, cutaway drawings, spec sheets, selection information. A. O. Smith Corp.

105 Solder
Here are 28 pages of information on soldering. There are sections on applications, properties of solder, and types of fluxes and solders. Charts and photographs. Kester Solder Co.

106 Solder
Catalog demonstrates the principles of soldering. The 35-page booklet is indexed, offers help in selecting the right solder and fluxes, suggests applications. Catalog No. 71-50-46. American Smelting & Refining Co.

107 Brushes
Brushes—all kinds—are the subject of this 76-page fully indexed catalog. Tells how to select and use, gives care and maintenance information. Useful tables. Catalog No. 210. Osborn Mfg. Co.

108 Record Control
This 6-page folder shows you a card index system that can help you keep your preventive maintenance records straight. Gives features of the system. Bulletin No. KD 449. Remington Rand Inc.

Turn the page

MAXIMUM FLOOR LIFE

Whether you install a new floor or a topping on an old base, the upper ¾ inch will take the beating from aggressive traffic forces. To resist wear, not only at the new surface, but down through the topping as it wears, extreme density of material is essential to maximum floor life.

DYNAPAKT FLOORS utilize two-ton blows to compact low water ratio concrete into less space for highest density and complete absence of voids. The entire depth of the topping is worked to place large stone fractures of greatest strengths in their most stable position, held firmly by a dense matrix for maximum wear and longest life.

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Free NEW CATALOGS

Begins on page B-124

PLANT SERVICES

109 Industrial Equipment
Finishing systems, metal cleaning equipment, air supply systems, ovens, hoppers, and other industrial equipment are described and illustrated in this 12-pager. Bulletin No. A652. The R. C. Mahon Co.

110 Industrial Lighting
There are 38 case studies of lighting problems in this 44-page catalog. Photos and diagrams demonstrate solutions. Light selection tables. Bulletin No. 1b-1187. General Electric Co.

111 Plant Lighting
How to reduce eyestrain and improve morale is the feature of this 30-pager. Charts, photographs, and a recommended plant lighting program help you do your planning. Complete line of lighting equipment shown. Catalog No. AD 5573. Benjamin Electric Mfg. Co.

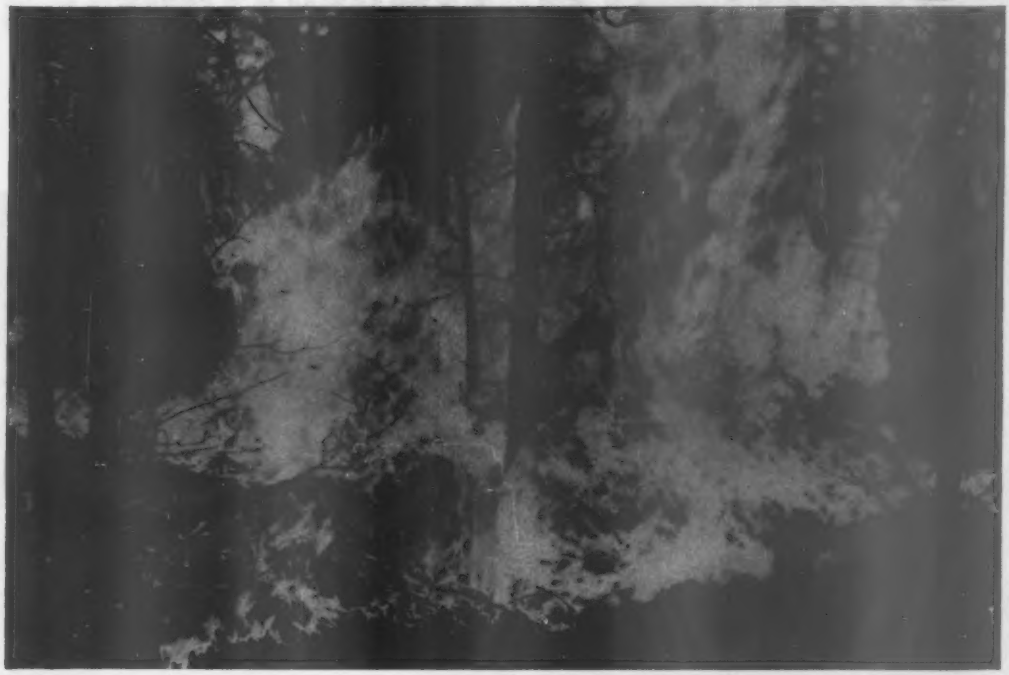
112 Fluorescent Luminaries
Features, specifications, and illustrations of a complete line of fluorescent luminaries and accessories. Useful chart on lighting included. 8 pages. The Miller Co.

113 Protective Lighting
A 24-page catalog can help you choose your lighting for plant safety and security. Product and light-requirements information, suggestions for application. Catalog No. B-4791. Westinghouse Electric Corp., Lighting Div.

114 Fluorescent Fixtures
In this 76-page collection of bulletins you'll find a full line of commercial and industrial fluorescent fixtures. Features, specifications, installation infor-

Turn to page B-168

You can't stop a raging fire with a garden hose



You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings . . . they can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

FIRST—Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a base* of coal-tar pitch that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

FURTHER—Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. And these coatings provide up to 8 times the film thickness of conventional paint coatings.

FINALLY—Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains a metallic base.*

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Please send me, without charge or obligation, your booklets on corrosion prevention.

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SOLD THROUGH INDUSTRIAL DISTRIBUTORS

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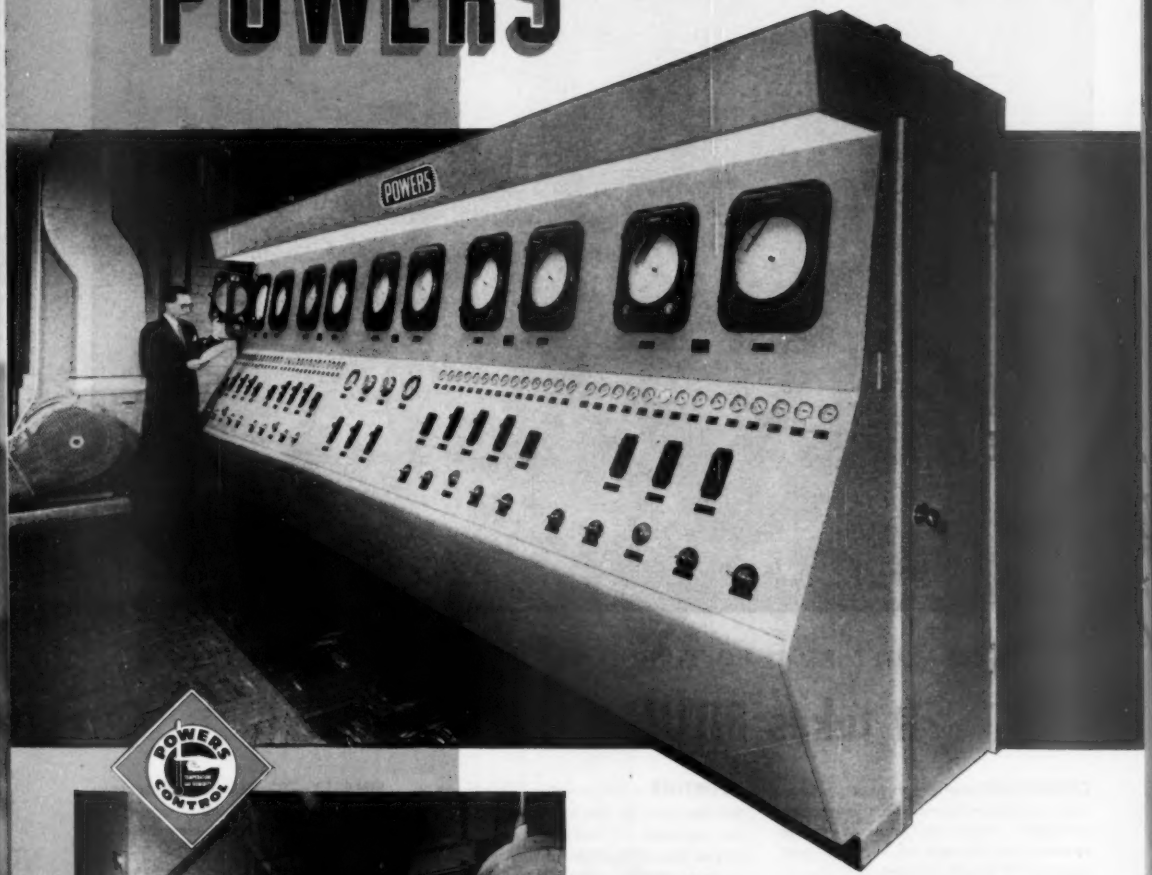
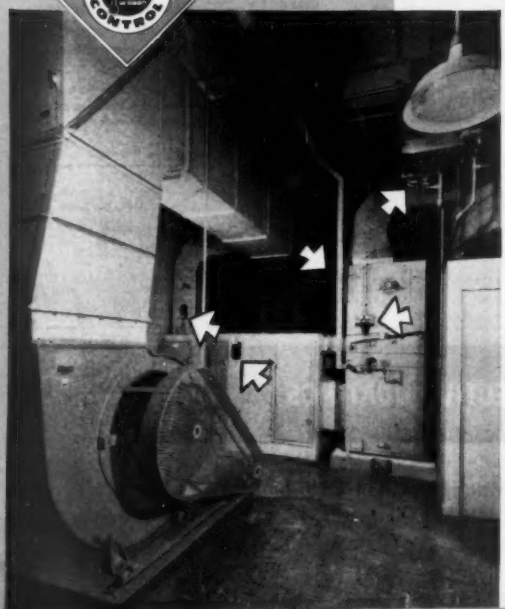
DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

In Your "*Factory of the Future*" Install—

POWERS TEMPERATURE and



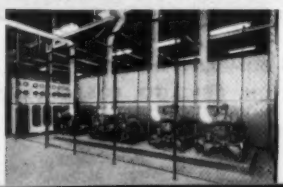


POWERS Design for MODERN CONTROL PANEL

In the unique functional design of this Control Panel are integrated various types of POWERS pneumatic controlling, indicating and recording instruments. It masterminds the operation of four complete year round air conditioning systems in the modern plant shown on the next page.

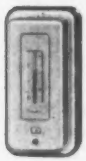
Photos at left and top and bottom of next page show air conditioning systems regulated by the Control Panel. Arrows indicate Powers controls.

Photo below, left—shows four refrigerator compressors, one for each air conditioning system; photo right—Powers air compressor and pilot valves supplying air pressure for control system.



HUMIDITY CONTROL

to Help You Produce More Goods and Better Goods at Lower Cost



Room Thermostat for Offices

POWERS pneumatic control systems prevent OVER-heated air in offices, factories and process rooms. Comfortable, healthful room temperature—

★ **Increases Output of Workers**—Overheated air hastens fatigue, causes mistakes, accidents, increases colds, absenteeism and reduces production.

★ **Cuts Heating Costs up to 25%**—Keeping each room at its proper temperature prevents waste of fuel from OVER-heating.

Constant Temperature and Humidity conditions in each room can be maintained at any predetermined point with Powers control. It can be installed in existing as well as new buildings.

25 to 40 Years of Dependable Service with very low maintenance cost is reported by hundreds of users. Powers control is notable for its continuous accurate performance.

Precision Control for Processes—Wherever product uniformity and quality are dependent upon precise temperature and humidity regulation, use Powers controlling, indicating or recording instruments.

Sessions Engineering Co., Architects and Engineers.

New modern plant commemorating 60th anniversary of The Powers Regulator Co., pioneer in pneumatic operated controls for heating, air conditioning systems and industrial processes.

Phone or write our nearest office for consultation with you, your architect or engineer, in selecting the type of control that will give the highest return on your investment.

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Established 1891 · SKOKIE, ILLINOIS · Offices in Over 50 Cities

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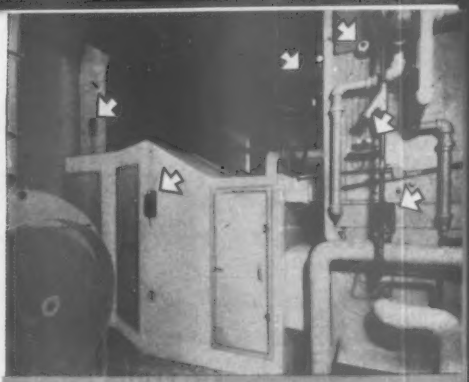
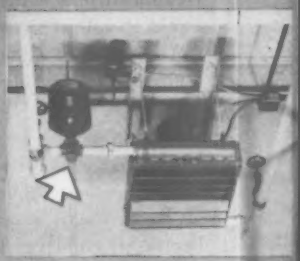
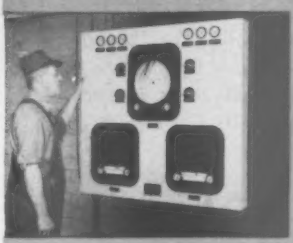


POWERS

Above: Arrows indicate some of the many controls applied to air conditioning system: Powers Duct Hygrostat, Duct Thermostat, Pneumatic Switch, Diaphragm Valves and Damper Motors Static Pressure Regulators, etc.

Photo at right shows ceiling type unit heater used in factory. It is controlled by wall type thermostat which also regulates Vulcan fin type radiation below windows.





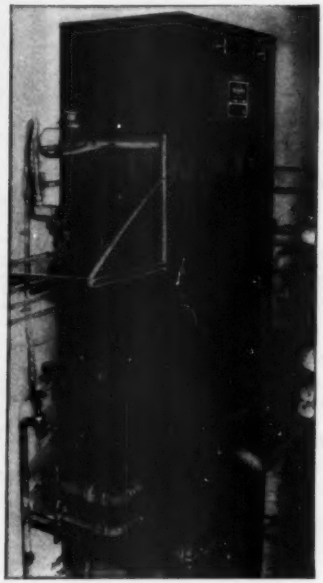
Left: Instrument panel for Powers MASTROL System of forced hot water temperature control for heating.

Below: Factory fresh air ventilating units heat and filter outdoor air, providing two air changes per hour in winter and ten in summer.

POWERS

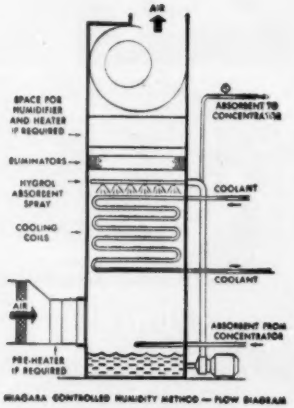
New "Controlled Humidity" Method Gives a Better Solution to Air Conditioning Problems

"Hygrol" Absorbent Liquid Dehumidifies Fresh Air Without Refrigeration



NIAGARA Air Conditioners or Dehumidifiers using "Hygrol" liquid absorbent give precise control of air temperature and humidity... at lower operating cost, with large savings in space and with smaller and less expensive equipment, in many applications.

This method dehumidifies the air by passing it through a chamber in which "Hygrol" spray removes its moisture and produces a low dew point. The "Hygrol" solution resulting is continuously and automatically re-concentrated, providing always full capacity in air conditioning and assuring always a constant dehumidifying capacity and a trustworthy, constant condition for your material, apparatus, process or room to be conditioned.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

"Hygrol" is a liquid, not a salt solution; it stays pure and non-corrosive; it does not cause maintenance or operating troubles in food plants or in chemical processes.

Investigate this new Niagara Method for "comfort" air conditioning as well as to protect quality in hygroscopic material, or processes or instruments, or to prevent condensation damage to metals, parts or products.

Write for Bulletin 112

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. F, 405 Lexington Ave. **New York 17, N. Y.**

Experienced District Engineers in all Principal Cities of U. S. and Canada

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mation, tables included. Smithcraft Lighting Div.

115 Blending System
If your plant does any precision blending, this 12-page bulletin may interest you. Tells about a system that you can use to mix, blend, or compound materials. How-it-works data, operation information. Bowser, Inc.

116 Workbenches
Steel workbenches are the main feature of this 72-page collection of bulletins. Specifications, price lists, detail drawings. Also a section on screws, precision dowel pins, and pressure plugs. Standard Pressed Steel Co.

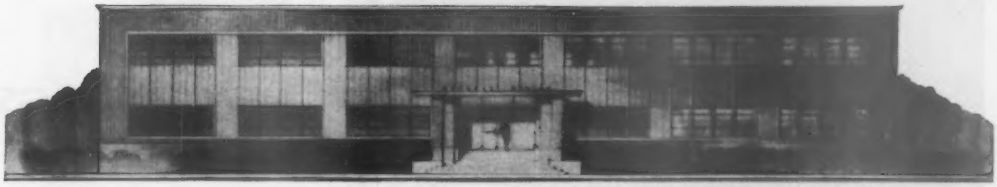
117 Plumbing Fixtures
A 24-page catalog (No. P-143) brings you descriptions of a full line of industrial plumbing fixtures. There's also a section on fittings. Fully illustrated. Kohler Co.

118 Washfountains
Features, details of construction, and specifications of washfountains in this 24-page catalog. Sections on showers and drinking fountains, washroom planning. Catalog No. 4701. Bradley Washfountain Co.

119 Fence
Here's an 8-page bulletin on industrial fence. Tells you how fence is made and how it's installed. Also data on chain link fabrics and wire mesh partitions. Catalog No. A-50. Atlas Fence Co.

120 Galvanizing Service
This 12-page bulletin shows you how company's hot-dip galvanizing process works. Illustrations of typical installations

PLANNING A NEW BUILDING?



U·S·S 17 STAINLESS STEEL will be used in the insulated exterior walls of this office building to be constructed at a United States Steel Company plant.

Get all the facts on construction with

U·S·S 17 STAINLESS STEEL

(No CMP tickets needed)

● Whether it's an office building, a manufacturing plant, a warehouse or a power station, Stainless Steel walls and roofs have *more* to offer you today than any comparable material.

PRACTICAL

Stainless Steel's corrosion resistance makes it one of the most practical materials for buildings that must go up and stay up. In highly corrosive atmospheres, where ordinary roofing materials lasted only two years, Stainless sheets have been found mechanically sound after 25 years of service. Fast, all-weather erection and simplified construction are other practical reasons for choosing this material.

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From a cost standpoint, Stainless Steel is competitive with masonry walls, initially as well as in the long run. And, because of its long life, cost-per-year is much lower than that of other materials. Stainless Steel's greater strength permits the use of lighter gages and lighter supporting members, further reducing the initial cost of the building.

AVAILABLE

Most important of all today, the grade of Stainless Steel suited for this type of application—U·S·S 17—is available now without CMP tickets. Its use is described in detail in our new booklet on this type of construction; use the coupon at right to obtain your copy.

THIS MANUFACTURING and storage building at E. F. Hauserman Company, Cleveland, has an exterior of 24-gage Stainless Steel panels, each made up of five vertical sections.

United States Steel Company
Room 2801-E, 525 William Penn Place, Pittsburgh 30, Pa.

☐ Please send me your booklet "U·S·S Stainless Steel for Walls and Roofs of Industrial Buildings."

*☐ Please arrange to have your customers send me literature on their particular type of Stainless Steel roof and wall panels.

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*United States Steel is the producer of U·S·S Stainless Steel sheet and strip, not a maker of formed roof and wall panels. These are now being manufactured by a number of our customers.

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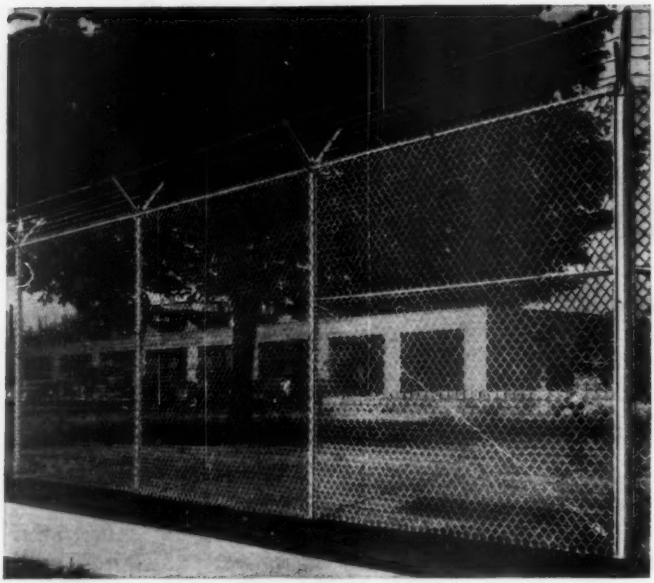

watchmen can't guard every corner at once . . . but

Anchor Fence Does

WITH Anchor Fence on the job, your plant buildings and grounds are *completely* protected, *day and night!* Trespassers, snoopers, thieves, agitators and trouble-makers of all kinds can't get in! Anchor Fence is truly everywhere at once, always "awake," always on guard!

In addition, an Anchor Chain Link Fence enables you to make full use of outdoor space for storing materials and supplies . . . freeing valuable factory space and reducing the need for new construction. And you can control traffic in and out of your plant more efficiently!

What's more, Anchor Fence gives you *long-lasting* protection. Deep-Driven Anchors hold the fence permanently erect and in line in any soil or weather, yet permit relocation at any future time. "Squar-Form" corner posts and square frame gates of "Squar-Form" tube steel are other exclusive features that make genuine Anchor Fence your best buy!

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Nation-wide Sales and Erecting Service

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and application information. Bulletin No. TE-10. Detroit Steel Products Co.

121 Heating Coil
A 32-page catalog is designed to help solve heat transfer problems in industrial processes. Describes maker's heating coil, gives typical layouts. Tables, charts, graphs. Bulletin No. 514. Kold-Hold Mfg. Co.

122 Freight Elevators
This 44-page catalog on freight elevators tells about design, selection, and cost information. There are parts descriptions and sample layouts. Complete specifications. Catalog No. B-4402. Westinghouse Electric Corp., Elevator Div.

123 Fire Protection System
A carbon dioxide fire extinguishing system — how it works and what it can do—is the subject of this 16-page folder. Shows available models, gives cost information. Form No. I-7. Walter Kidde & Co., Inc.

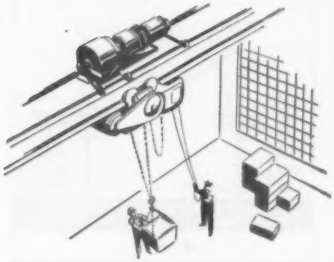
124 Fire Protection
Information about a fire protection system that can be engineered to minimize your special fire hazards. Photographs of installation, list of features and advantages. 8 pages. Grinnell Co.

125 Lube System
A 16-page bulletin explains a centralized lubrication system. Each piece of equipment is illustrated and described. Section on fittings and accessories. Form 238. Farval Corp.

126 Floor Sweepers
A folder illustrates how a floor sweeper can make your plant housekeeping easier. Fea-

American Blower . . . a time-honored name in air handling

Albuquerque, N.M., has a conveniently located American Blower office to provide you with data and equipment for air handling. You can reach American Blower in Albuquerque by calling 3-2247. In other cities, consult your phone book.



SMOOTH POWER

If you're concerned with power transmission you'll want to know more about our Gŷrol Fluid Drives. They offer three important advantages—smoother acceleration, overload protection and substantial power savings. One company uses Fluid Drive on a crane that picks up ladles of hot metal. Before they were installed, the ladles got a violent swing from the quick start and were hard to control. Since using Fluid Drives they've had no trouble.

R FOR AIR

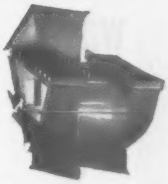
One of the stiffest tests air handling equipment can get is that imposed by hospital laboratories. Cultures and tests require a sterile atmosphere. Temperature and humidity must often be closely controlled. Recently, a large university hospital selected American Blower ventilating equipment for its new laboratory . . . a fine tribute not only to the quality of American Blower products, but also to the effectiveness of our research and testing methods. Why not put this valuable experience to work for you?

BETTER BURNING

American Blower Mechanical Draft Fans play an essential part in the efficient operation of several new municipal waste disposal works. The high static efficiency, low RPM, low tip speed and rugged construction of these dependable fans help provide and maintain proper combustion without high power costs. In military or civilian installations American Blower equipment meets the most exacting requirements. If you are expanding or enlarging your facilities, consult us.

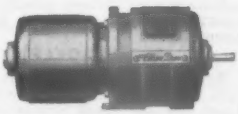
If your needs call for heating, cooling, drying, air conditioning or air handling equipment you'll find American Blower an excellent source of supply. For data phone or write our nearest branch office.

Unit Heaters

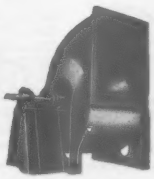


Mechanical Draft Fans

Dust Collectors



Gŷrol Fluid Drives



Industrial Fans

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was this slip necessary?

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Free NEW CATALOGS

Begins on page B-124

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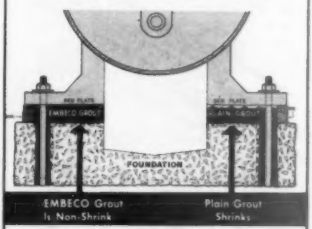

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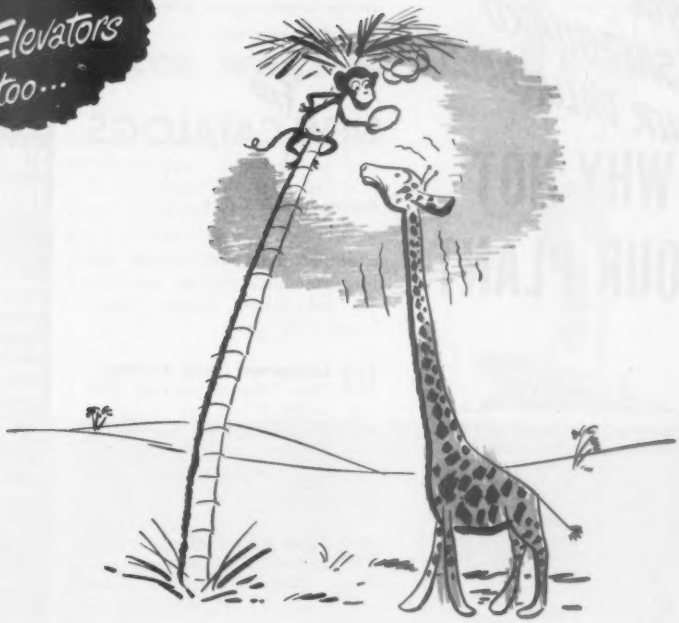

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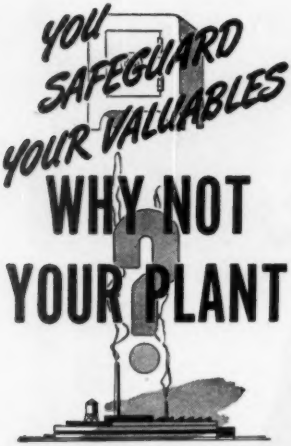

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Gives recommendations for use, fabrication information, and typical installation photos. Saran Lined Pipe Co.

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Two catalogs, one 20 pages, the other 28 pages, on tube and pipe fittings and industrial hose. Product descriptions, assembly instructions, technical data, and specifications. Catalog Nos. F-1456-A, H-1451-B. The Weatherhead Co.

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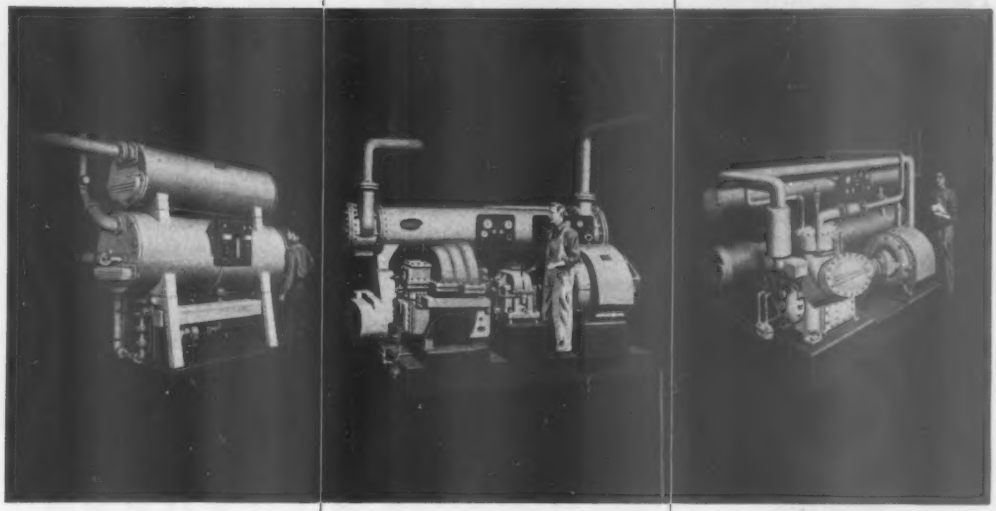

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140 Pressure Reducing Valves Engineering, operating, and maintenance data on pressure-reducing valves in this 20-page catalog. Included are selection tables, capacity tables, and do's and don'ts on adjustment-making. Bulletin No. 461-B. Leslie Co.

For catalogs 141 through 157 see Plant Engineering Problems, page 260, and Plant Operating Problems, page 264.

DUPLICATE COUPON ON PAGE B-124

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FACTORY MANAGEMENT & MAINTENANCE (April, 1952)
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61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
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106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
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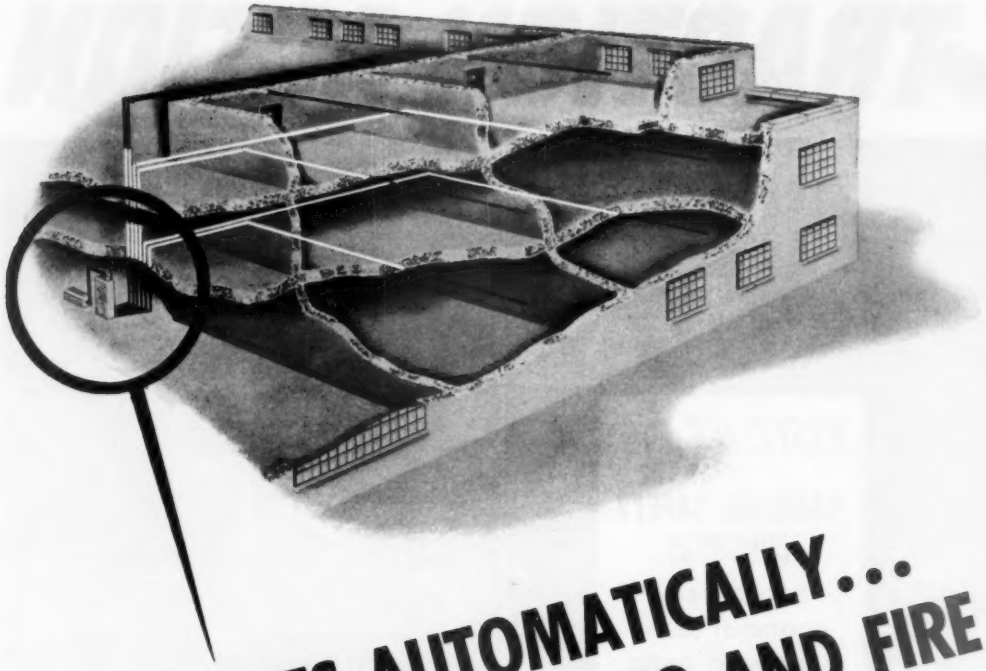

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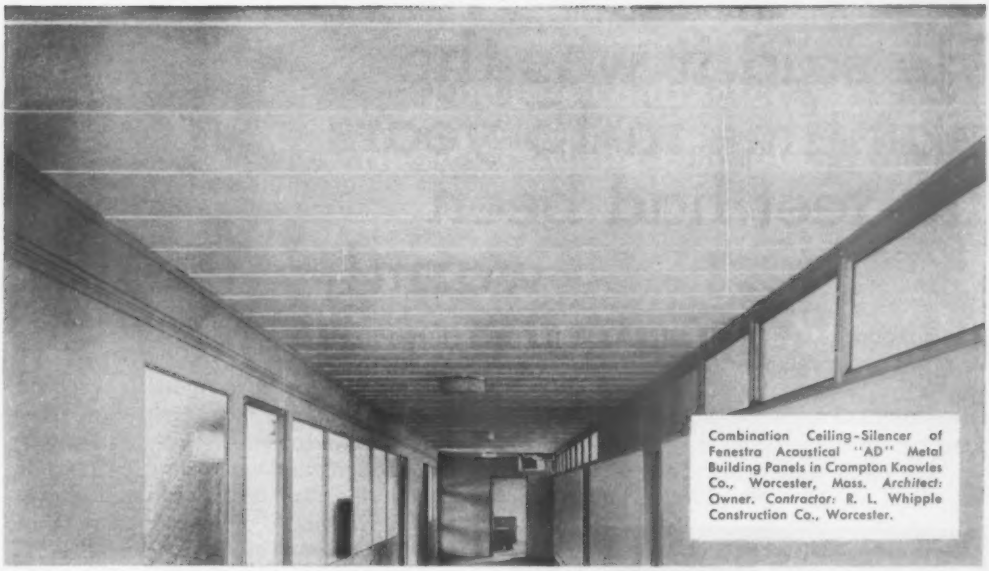

Combination Ceiling-Silencer of Fenestra Acoustical "AD" Metal Building Panels in Crompton Knowles Co., Worcester, Mass. *Architect:* Owner. *Contractor:* R. L. Whipple Construction Co., Worcester.

Fenestra's New Structural-Acoustical Ceiling Keeps Rooms Quiet . . . Cuts Building Costs

Here's a wonderful, economical way to hush the hubbub in corridors and rooms in the new building you're planning.

Fenestra* Acoustical "AD" Metal Building Panels form acoustical ceiling and structural subfloor or roof—all in one package . . . saving building time, labor, materials and money!

An "AD" Panel is a box beam with a flat surface top and bottom and open space between. The top surface forms the subfloor or roof deck. The perforated bottom surface forms the ceiling. In the open space is glass fiber insulation (see illustration below).

You can see how a Fenestra combination Structural-Acoustical Ceiling cuts building costs. It is speedily and easily erected—the panels interlock. It is practically indestructible. Bumps and knocks can't hurt it. The acoustical efficiency is not affected by washing or painting. And these panels are noncombustible.

For further information call your Fenestra Representative. Or write Detroit Steel Products Company, Dept. FM-5, 2266 East Grand Boulevard, Detroit 11, Michigan. *Trademark

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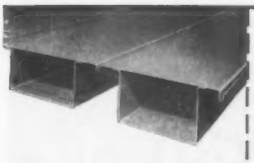
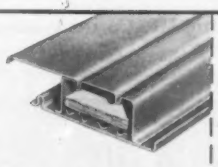
...engineered to cut the waste out of building

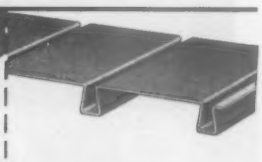


"D" Panels for floors, roofs, ceilings. Standard width 16". Depth 1½" to 7½".



Acoustical "AD" Panels for ceiling-silencer-roof. Width 16". Depth up to 7½".

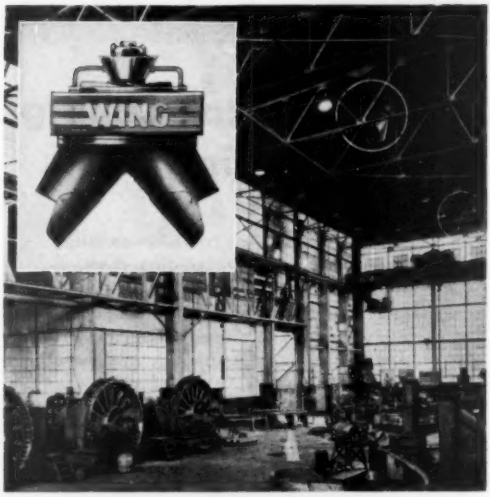
"C" Insulated Wall Panels. Standard width 16". The depth is 3".

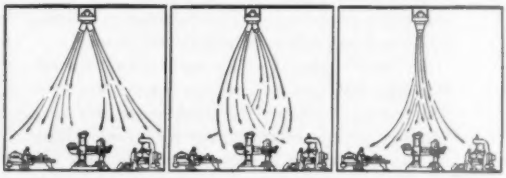


Holorib Roof Deck. 18" wide—lengths up to 24'. Surface can be plain or acoustical.

He said it was the first time in 15 years his feet had been warm!

IT happened in a large manufacturing plant in Pittsburgh where, originally, several conventional type unit heaters had been installed to heat a machine shop 300' long by 70' wide by 15' high. After many uncomfortable winters and many complaints additional units were installed. But complaints by workers continued, and finally led to an investigation of Wing Revolving Unit Heaters. First, the Wing engineer showed conclusively by smoke bomb demonstration that the warm air from the heaters in the plant did not reach the working level. Convinced of the soundness of the revolving discharge principle, the old heaters were removed and Wing Revolving Unit Heaters installed. A smoke bomb test showed how the warm air not only reached the floor, but gave complete coverage, circulating in, around and under heavy machinery and work in progress. The effect was remarkable. In fact, one old mechanic said it was the first time in 15 years his feet and legs had been warm!





Wing

REVOLVING UNIT HEATERS

Illustrated above are (left) a plant similar in type to the one mentioned in the story, showing Wing Revolving Heaters with discharge outlets for high ceilings. Other discharge outlets are available for medium heights and low buildings and rooms. The diagram (above right) shows how the constantly turning discharge outlets thoroughly and uniformly distribute the heated air, without hot blasts or cold drafts. Workmen feel only a sensation of fresh, live, invigorating warmth. Write for a copy of Bulletin HR-6.

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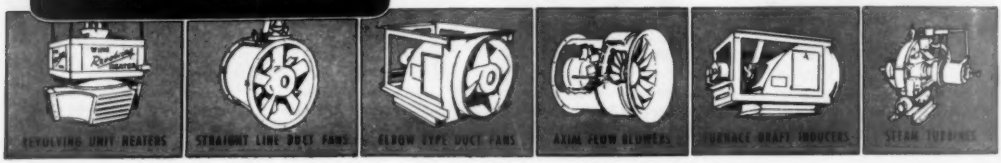
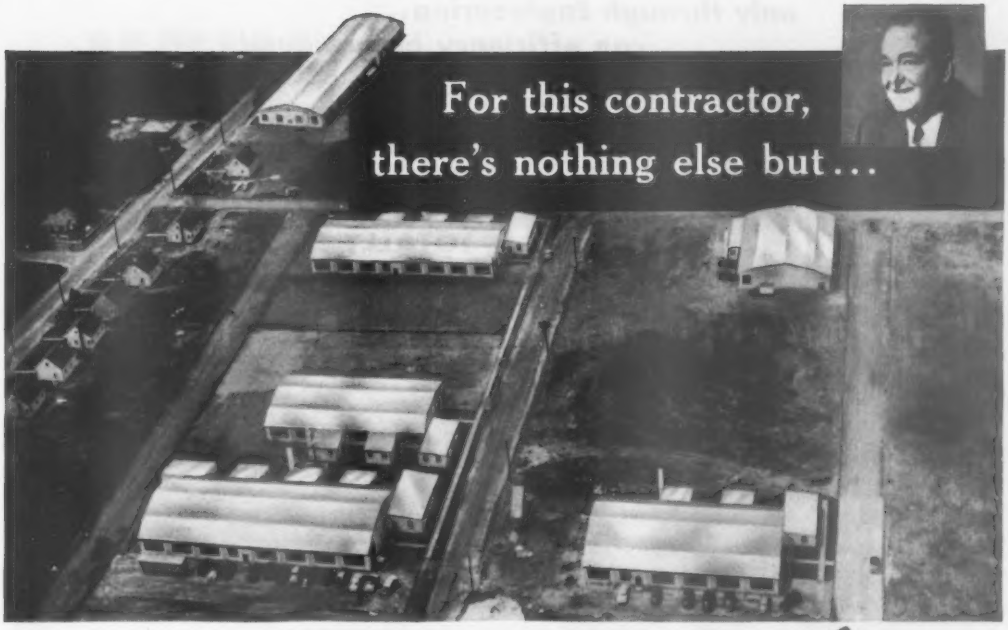


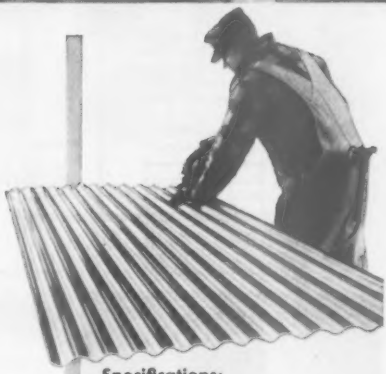


George Mole has been a contractor and industrial building owner in the Amityville, Long Island, area for 25 years. He discovered Reynolds *Lifetime* Aluminum Industrial Corrugated in 1949. He put his first 15,000 square feet on the Amityville School... then used it on the Copiague and Lindenhurst schools and on 13 other industrial and commercial buildings. Let him tell you why:

"First of all economy. Initial cost is low. The insulation value means still more economy, as well as more comfort inside. Low maintenance and long life extend economy through the years. And lighter weight (56 pounds per square) can save on construction.

"My Reynolds .032 roofs have set a standard in this area that I am proud of. I have more buildings planned, and if I can't get this roofing I won't build -- that's how sold on Aluminum I am."

Call Reynolds for literature and technical assistance... offices in principal cities. Check your classified phone book for our listing under "Building Materials" or write to Reynolds Metals Company, Building Products Division, 2007 South Ninth Street, Louisville, Kentucky.



Specifications:

Thickness .032"
Corrugations 7/8" deep, 2-2/3" crown to crown
Uniform load support (roof) 80 p.s.f. on 4' purlin spacing
Roofing width 35", coverage 32"
Lengths 5', 6', 7', 8', 9', 10', 11', 12'

Military demands for aluminum reduce supply, but Reynolds is rapidly expanding aluminum capacity. Rated orders receive priority handling.

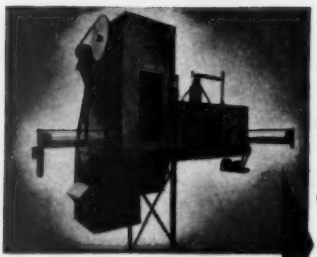
REYNOLDS *Lifetime* ALUMINUM INDUSTRIAL CORRUGATED

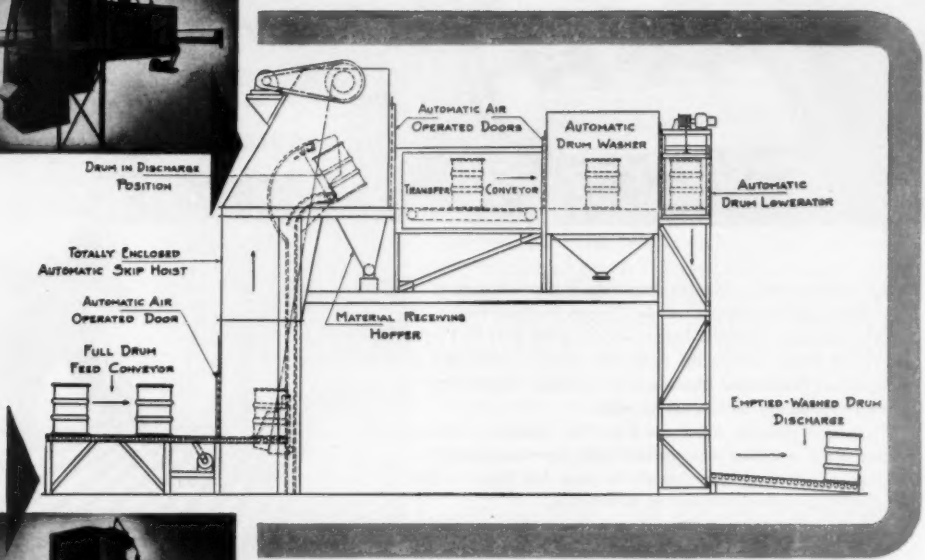
"The Kate Smith Evening Hour" on Television, Wednesdays—Tallulah Bankhead in "The Big Show" on Radio, Sundays—NBC NETWORKS

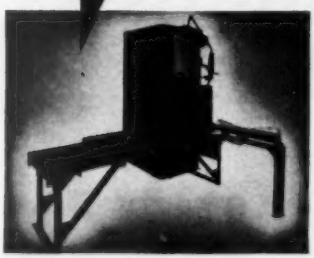
only through Engineering...
...can efficiency be achieved

G-W DRUM HANDLING SYSTEM

FULLY AUTOMATIC
TOTALLY ENCLOSED
DUST TIGHT







Faced with an ever-increasing bottleneck in drum handling, a large eastern manufacturer placed his problem in the hands of Gifford-Wood's Materials-Handling Engineers. The result was the fully automatic system shown in the drawing. This dust-tight, fully enclosed installation now handles drums at the rate of 30 to 40 drums per hour.

The cover of the full drum is removed at a point on the feed conveyor. The full drum is then elevated and inverted, pouring the contents over a vibrating grate into the receiving hopper. Carried on a transfer conveyor to the automatic washer, the drum is cleaned, then lowered to the discharge conveyor.

This is just one of many examples of how G-W materials handling know-how achieved efficiency through engineering — efficiency in this case reflected in automatic handling at a greatly increased rate, with elimination of waste and maximum safety — all at greatly reduced cost.

Call upon G-W Materials-Handling Engineers to survey your present methods; you are under no obligation. It might well prove to be a step toward higher profits through lower operating and maintenance costs.

When You Think of Materials Handling—Think of **GIFFORD-WOOD CO.**

Since 1814 • Hudson, New York

NEW YORK 17, N. Y. 420 LEXINGTON AVE. | ST. LOUIS 1, MO. RAILWAY EXCHANGE BLDG. | CHICAGO 6, ILL. 565 W. WASHINGTON ST.

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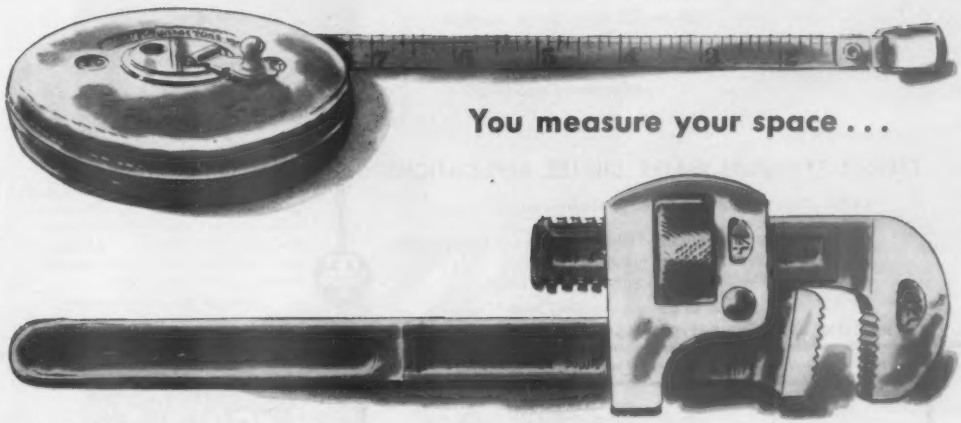
NEW! NOW!

SIX PRE-PACKAGED FIRE SYSTEMS TO FIT YOUR SPECIFIC NEEDS!



You measure your space . . .

anybody who can cut pipe can install them

Here is the answer to inexpensive built-in fire protection against flammable liquid and similar industrial hazards.

The new Kidde Standard Pak is a ready-made, pre-engineered fire extinguishing "package" for volumes up to 6,000 cubic feet. Anyone who can cut pipe can install it. Each kit contains dependable Kidde rate-of-rise heat detectors, efficient Kidde Multi-jet nozzles, and automatic discharge heads. Paks are supplied with or without pipe and fittings. Optional accessories include pressure trips and switches, remote controls, sirens, gongs.

A choice of six sizes assures you of the right package for your particular requirements. For complete information send us coupon below.

Please send me details on the New Kidde Packaged Fire Extinguishing System

NAME_____

FIRM NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Kidde

Walter Kidde & Company, Inc.

432 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

TYPHOON

PACKAGED WATER CHILLERS

COOLS LIQUIDS FROM WATER TO WINE!

Now — a compact, completely self-contained water chilling unit for a host of industrial and retail liquid cooling tasks. Rugged Typhoon engineering features include spray nozzles that require no cleaning, insulated water jacket, oversize all-copper condensers and cooling coils. Use these units singly (sizes to 20 tons) or in multiple units to meet any tonnage requirement. Easy to install, outstanding for trouble-free performance and long-life.

TYPICAL TYPHOON WATER CHILLER APPLICATIONS

- **CHILLED WATER** for year-round air conditioning with remote air handling units.
- **COOLING CUTTING OILS** and other liquids for industrial purposes.
- **CHILLED WATER** for drinking fountains.
- **COOLING OF WINE** or other liquids in bottling plants.

QUALITY-ENGINEERED TYPHOON EQUIPMENT

Self-contained units, 1½ to 20 tons • Multi-packaged systems to 60 tons • Evaporative condensers, 3-20 tons • Central plants • Packaged water chillers • Air handling units for chilled water or direct expansion • Boilers • Coils • Heat Pumps.

Write for detailed information

Specialists in Air Conditioning Since 1909

TYPHOON AIR CONDITIONING CO., Inc. • 794 Union Street • Brooklyn 15, N. Y.

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20 Years 20 ANNIVERSARY WATER COOLERS

fedders

water coolers

Lack of cool drinking water is the thief of time throughout industry and business. Fedders Electric Water Coolers pay off in time-savings, production efficiency and employee health. Beware of your high cost of being without. Write Fedders, Dept. F-12

FEDDERS-QUIGAN CORPORATION

57 TONAWANDA STREET BUFFALO 7, N. Y.

TRAINED CREWS...

make

Kalman

"ABSORPTION PROCESS"

CONCRETE FLOORS

TOUGHER, UNIFORMLY HARDER, LONGER-LASTING

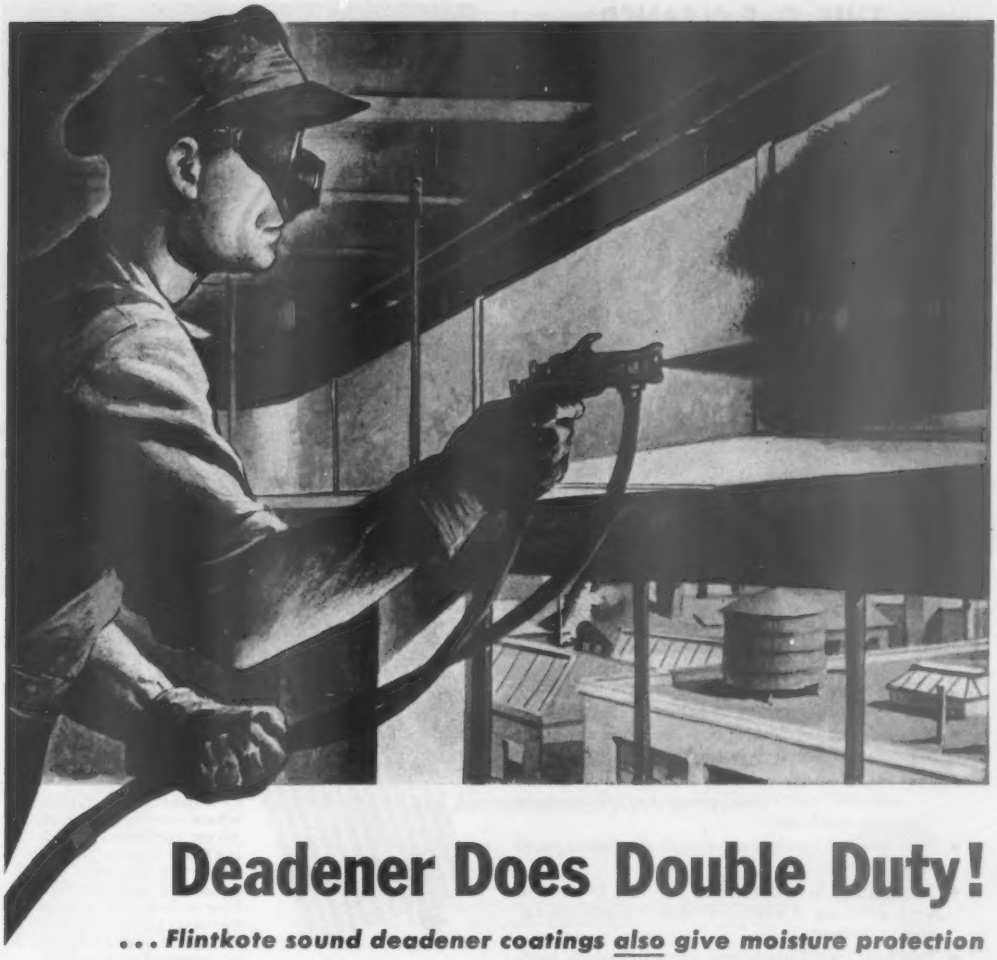
Only Kalman's crews lay Kalman heavy duty concrete floors. These are highly skilled teams, backed by 36 years' experience in laying over 250,000,000 square feet of concrete. This "know how" pays dividends in longer floor life and low maintenance!

WRITE FOR FREE BOOKLET!

KALMAN FLOOR CO., INC.

110 East 42nd Street, New York 17, N. Y.

Boston • Charlotte • Chicago • Cleveland • Dayton • Detroit Houston • Los Angeles • Philadelphia • San Francisco



Deadener Does Double Duty!

... Flintkote sound deadener coatings also give moisture protection

When light metal objects set up howls or humming noises, it's time to go gunning for vibration.

Load up your spray gun with Flintkote Sound Deadener and you'll smother noises *pronto*...all along the line.

In addition, you'll shut out moisture...and so kill two birds with one shot.

Use spray- or trowel-applied Flintkote Sound Deadeners on noisy ventilation ducts, blowers, steel partitions, flues and other light sheet metal.

Choose a high tenacity, quick drying solvent type or a non-inflammable emulsion type sound deadener. Flintkote offers you both.

Get complete information on this two-way Flintkote sound and moisture protection. Increase personnel efficiency...save nerves, and money.

And for a quick, "meaty" description of other Flintkote materials that may be able to serve you better, write for your copy of the new "Flintkote Industrial Products Digest."

THE FLINTKOTE COMPANY, *Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y.*

Atlanta • Boston • Chicago Heights • Detroit
Los Angeles • New Orleans • Washington

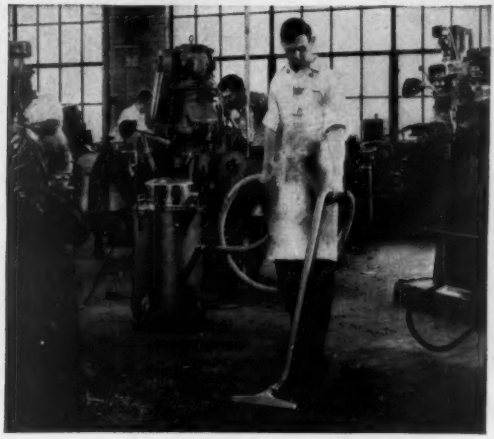
The Flintkote Company of Canada, Ltd., 30th Street, Long Branch, Toronto, Canada.

FLINTKOTE
Products for Industry

THIS G-E CLEANER

Helps you *Save Money*

Helps you *Save Time*



THESE modern, G-E Heavy-duty Cleaners have many special features:

- They help you cut cleaning time . . . a sure way to cut maintenance costs.
- They switch quickly and easily from wet to dry pickup . . . powerful motors pick up mop water, dust, coarse litter with equal ease.
- They have extra-wide nozzles to cut the cleaning time of larger areas.
- They convert in a moment to *powerful blowers* for quick gathering of scrap into convenient piles for salvage or disposal.
- They have special attachments for cleaning high, hard-to-reach areas thoroughly and quickly.

These are but a few of the features that make G-E industrial cleaning equipment so productive.

MAIL COUPON FOR DETAILS

Heavy-Duty Cleaning Equipment

GENERAL ELECTRIC

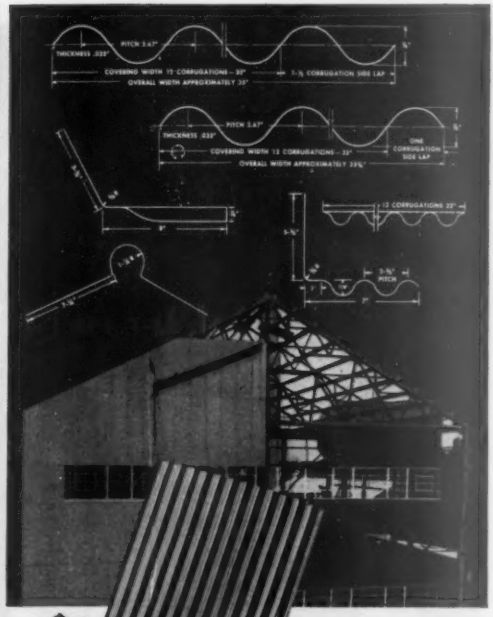
GENERAL ELECTRIC COMPANY, Dept. 22-1330
1285 Boston Ave., Bridgeport 2, Conn.
Without obligation, please send complete details on heavy-duty cleaning equipment.

NAME .....

FIRM .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....



PUT UP MORE ROOFING and SIDING per man hour

Cost and time are slashed when you build with Alcoa Industrial Building Sheet. Light in weight (only 56 pounds per square) it goes on fast. Low in first cost, it piles up savings because it's so easy to apply... needs no protective painting. It can be applied with a variety of fasteners including weldable studs. Available, with a full line of accessories, in the following sizes:

Lengths: 5 to 12 feet.
Widths: Roofing, 35 in. Siding, 33⅓ in. 32 in. coverage.
Thickness: .032 equal to 21 U. S. Gauge.

Write for complete engineering and application details.

ALUMINUM COMPANY OF AMERICA
804D Gulf Bldg. • Pittsburgh 19, Pa.

ALCOA
INDUSTRIAL BUILDING SHEET

In the critical Cigar Conditioning Room of D. W. G. Cigar Corporation, Lima, O. **(home of such famous cigars as R. G. DUN, EL VERSO, and SAN FELICE)**, walls are ¼" "Century" APAC. This asbestos-cement structural board is also used in the Cigar Machine Room and Tobacco Conditioning Tunnel.

"These walls of 'Century' APAC are an added safeguard where temperature and humidity must be accurately controlled,"

says J. P. Weller, Master Mechanic—

No nurse in an infants' ward ever guarded her charges more jealously than D. W. G. Cigar Corporation watches over the thousands of quality cigars they turn out every day.

So when J. P. Weller, D. W. G.'s Master Mechanic, chooses "Century" APAC for the walls of the important Cigar Conditioning Room, you can take his word that APAC is an ideal material where temperature and humidity are accurately controlled.

And because APAC is made of mineral asbestos and portland cement, you know fire can't burn it . . . water can't soak it and termites can't eat it.

You'll find this asbestos-cement structural board gives you as low a first cost and maintenance expense (*never* needs painting!) as any comparable material you can use for interior or exterior walls . . . ceilings . . . partitions . . . and linings.

It goes on fast, too—big sheets (standard 4′ x 8′) can be cut or drilled and fastened easily with screws or ring-fettered nails. Write us for details about "Century" APAC . . . and name of your nearest distributor.

Nature made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873.

K&M best in asbestos

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

Spilled foods won't spoil

AZPHLEX FLOORS

theyr'e greaseproof!

In industrial cafeterias and lunchrooms . . . wherever food is served . . . *Azphlex* Thermoplastic Tile serves best. It's greaseproof against the fats and oils commonly found in food . . . it's long-wearing, made to give years of service . . . and it's mighty *good-looking*, too, with the widest color range in its class.

BEAUTIFUL, BRIGHT COLORS

Seventeen light, bright colors best suited for modern decoration and design . . . particularly good colors for factory cafeterias and food-serving areas.

DOLLAR STRETCHING DURABILITY

Resistance to abrasive wear that means lasting beauty and low cost. Smooth surface and through-the-thickness marbleizing keeps Azphlex floors looking new for years.

A LOW PRICE TAG

A premium quality tile in premium colors at only a few cents more per square foot than ordinary tile. Convince yourself . . . compare it with any other similar product!

For detailed literature and sample tiles, write to:

UVALDE ROCK ASPHALT COMPANY

FROST BANK BUILDING • SAN ANTONIO, TEXAS

Makers of AZROCK Asphalt Tile, AZPHLEX Thermoplastic Tile and VINA-LUX Reinforced Vinyl Tile

"AZROCK Makes Fine Floors"

WATCO

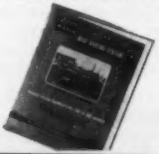
ROOF COOLING SYSTEMS can keep your workers at top efficiency through more comfortable summer working conditions.

If you're interested in an efficient, simple and economical way of cooling your plant this summer, get information *now* on the WATCO method of roof cooling.

Here is a tried and proved way to lower inside temperature of your plant from 10° to 15° F., assuring far greater worker efficiency because of more comfortable conditions.

No large initial capital investment in air conditioning units is necessary. Maintenance and operating costs are exceedingly low. WATCO offers you a simple system of spraying your roof with water . . . waste water if available . . . that can be easily installed either by us or by your own plant maintenance men.

Ask for the names of a few of the many representative industrial plants using the WATCO system.



For further information write for our Bulletin #20 and supplementary Bulletin #20A.

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Engineers and Contractors

71 NASSAU STREET, NEW YORK 38, N. Y.

MULLER MIXER TRADE MARK

CONCRETE MIXERS

2—3 and 3½ Cu. Ft.

PLASTER and MORTAR MIXERS

3—6 and 10 Cu. Ft.

CONCRETE CARTS

MORTAR BOXES

CONCRETE CHUTES

Some Dealer Franchises Available.

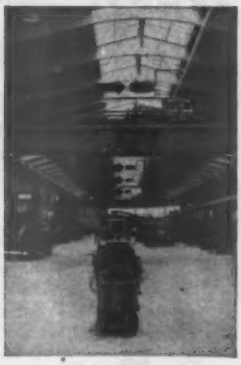
Write for complete information.

MULLER MACHINERY CO., INC.

DEPT. F.M. METUCHEN, N. J.

WHAT'S YOUR FACTORY HEATING PROBLEM?

High Ceilings



Conveyors or Craneways

Door or Window Drafts

Remote Space to be Heated

TRANE unit heaters—
6 of them—have the answer!

To solve the many special problems of factory heating takes more than one kind of unit heater. It actually takes six—and TRANE builds all of them.

The TRANE Projection Heater handles high ceilings, craneways. For ventilation, use the Torridor, or the TRANE Powered Ventilating Heater. Doors and windows can be blanketed with a TRANE Horizontal Unit Heater. For lobbies there's the TRANE Force-Flo Heater. If gas is available there's the TRANE Gas Fired Unit Heater.

These six TRANE Unit Heaters, together with two exclusive patented diffusers, enable you to find the right combination for *your* factory heating problem.

Matched for perfect service with TRANE Unit Heaters are TRANE Steam Specialties; bucket, float and thermostatic traps for high and low pressures.

See your nearest TRANE sales engineer or write TRANE, La Crosse, Wis.

TRANE Projection Heater

TRANE Torridor

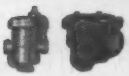
TRANE Model H Unit Heater

TRANE Gas Fired Unit Heater

TRANE Force-Flo Heater

TRANE Powered Ventilating Heater

TRANE Wall Fin

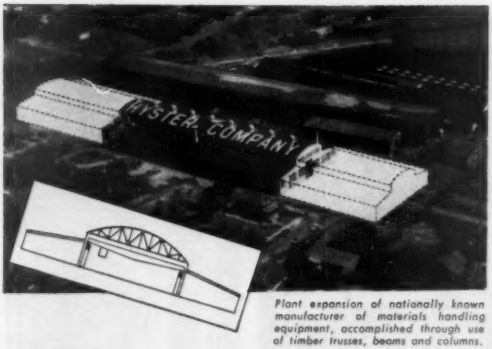


TRANE Bucket and Float Traps

TRANE

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pa.
Trane Company of Canada, Ltd., Toronto
Offices in 80 U.S. and 14 Canadian Cities

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT



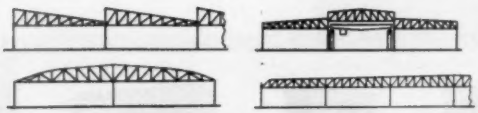
Plant expansion of nationally known manufacturer of materials handling equipment, accomplished through use of timber trusses, beams and columns.

Expandable Buildings for Growing Industry

Readily available in desired spans, trusses and framing by Timber Structures, Inc., provide the practical answer to new industrial plant construction and to expansion of existing buildings.

These structural units are genuinely economical, both as to initial cost and lack of maintenance. Flexible and adaptable, they are suitable for any roof contour—flat, arched, sawtooth, or monitor. Design may include local loadings such as hoists, monorail installations, heating, ventilating units.

Details of span, dimensions, construction and common adaptations are contained in new booklet, "Industrial Buildings". Your nearest Timber Structures office has a copy for you; or fill in and mail the coupon.



TIMBER STRUCTURES, INC.

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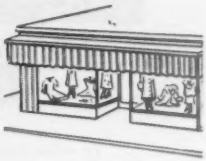
NOW! SKYLIGHT WITH RESOLITE

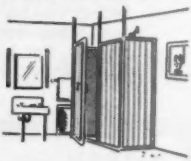
TRANSLUCENT STRUCTURAL PANELS

Resolite makes large skylight and wallight areas economical for corrugated industrial buildings because no special framing is required, either for support or weatherproofing — it nests with any standard corrugated sheet. Resolite permits substantial savings in plant lighting by its efficient diffusion of daylight through the building interior. Structurally rugged, chemically immune to weather extremes, and most industrial fumes, Resolite gives long life without protective treatment. Resolite is molded in standard sheet sizes and corrugations, made of polyester resins, reinforced with fiberglas mat — a quality product with controlled uniformity of thickness for strength and durability.



SPECIAL ARCHITECTURAL USES, TOO!

Resolite opens brand new vistas to the Architect, Builder and Interior Decorator. It answers the problem of what to use for colorful patio and portico covering, store front and bar facings, interior partitioning in homes, offices, corridors, shower stalls; for windows, skylight and decorative lighting panels, and limitless other uses where structural strength, light with privacy and decorative beauty are desired. Resolite is strong and rigid, yet light in weight, permitting lighter framing. It is shatterproof, avoiding the hazards of breakage. Resolite comes in a wide variety of colors, corrugations (including flat sheets) and surface finishes, providing endless possibilities in decorative effects. Carrying its own colorful surface finish, Resolite requires no treatment of any kind, and is easy to keep clean. Resolite is easy to use, requiring only ordinary tools and skills.



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RESOLITE CORPORATION
ZELIENOPLE, PA.

HERE'S WHY ACCOUNTANTS SAY

SPECIAL GREASE-PROOF KENTILE is ideal for lowering maintenance costs

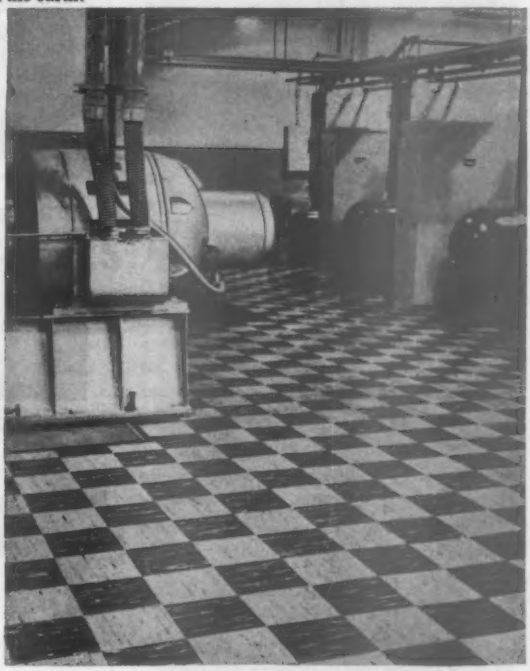
...can be installed for approximately 40¢ a sq. ft!*

Petroleum oils and greases won't stain or soften SPECIAL KENTILE Floors in machine shops, manufacturing areas, laboratories and other spaces where grease and oil are important maintenance factors. That's why maintenance expenses are reduced with floors of SPECIAL KENTILE . . . it's impervious to alcohols, alkalis, most acid solutions as well as petroleum oils and grease. Like regular Kentile it can be installed anywhere . . . over smooth concrete, wood or metal floors . . . even below grade in direct contact with the earth!

Because SPECIAL KENTILE now comes in bright, modern colors, it's the perfect floor to provide a feeling of light and air in plants, working areas, rest rooms, cafeterias and locker rooms. And, a cheerful, pleasant atmosphere means increased efficiency and greater production!

KENTILE adds safety to your floors. According to the U. S. Bureau of Standards no floor is safer to walk on than asphalt tile that does not have a high gloss finish. SPECIAL KENTILE is virtually fireproof, too.

KENBASE completes your floor. Apply it against any smooth wall where it meets the floor to seal cracks and crevices. Never paint it and never worry about marks, chipping or wear.



*Prices for Special Kentile for ⅛" thickness may be considerably lower or slightly higher depending upon the size and condition of your floor and the freight rates to your city. Consult your Kentile Dealer for a FREE estimate. He's listed under FLOORING in your classified phone directory. In Canada at T. Eaton Co., Ltd.

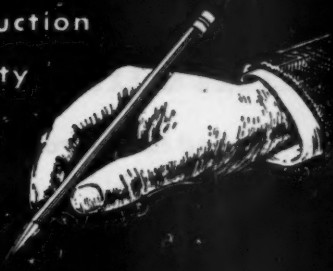
SPECIAL GREASE-PROOF KENTILE®

KENTILE • KENCORK • KENTILE RUBBER TILE

KENTILE, INC., 58 Second Avenue, Brooklyn 15, New York • 350 Fifth Avenue, New York 1, N. Y. • 705 Architects Building, 17th and Sansom Streets, Philadelphia 3, Pennsylvania • 1211 NBC Building, Cleveland 14, Ohio • 225 Moore Street, S.E., Atlanta 2, Georgia • 2020 Walnut Street, Kansas City 8, Missouri • 1440 11th Street, Denver 4, Colorado • 4532 South Kolin Avenue, Chicago 32, Illinois • 1113 Vine Street, Houston 1, Texas • 4501 Santa Fe Avenue, Los Angeles 58, California • 95 Market St., Oakland 4, Calif. • 452 Statler Building, Boston 16, Mass.

Check which of these will help you most

- Higher Production
- Better Quality
- Lower Costs
- Dustless Operation



Manufacturers, both large and small, in your own field have achieved not merely one or two but all of these objectives through application of

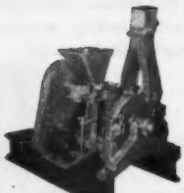
THE MIKRO PLAN FOR PROCESSING EFFICIENCY

The Mikro-Plan is not a theoretical treatise. It is a working system based on the data from 55,000 Laboratory tests made over the past 25 years . . . reinforced by performance records from installations of MIKRO-PULVERIZERS, MIKRO-ATOMIZERS and the new MIKRO-COLLECTORS.*

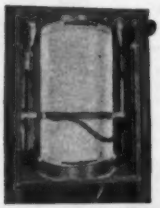
If you have a pulverizing or dust control problem let our engineers study it for you. They will tell you frankly whether or not our equipment, integrated in the Mikro-Plan is for you.

It will cost you nothing to investigate the merits of the Mikro-Plan. Just write today for your copy of our Confidential Test Grinding or Dust Collecting Data Sheets.

*Patents applied for by H. J. Hersey, Jr. and Pulverizing Machinery Company



MIKRO-ATOMIZER for ultra-fine grinds



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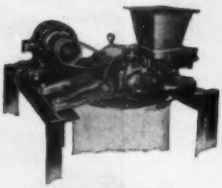

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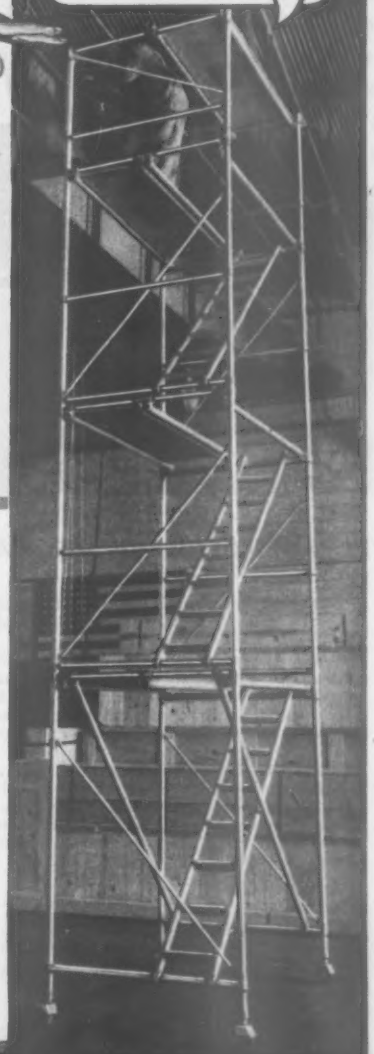

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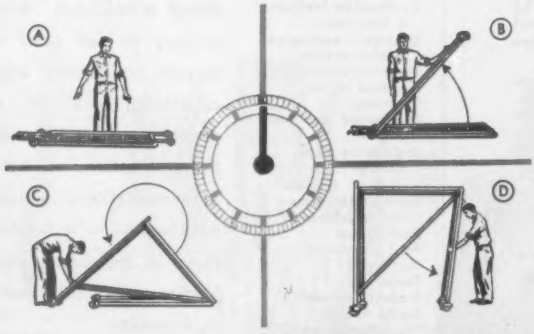

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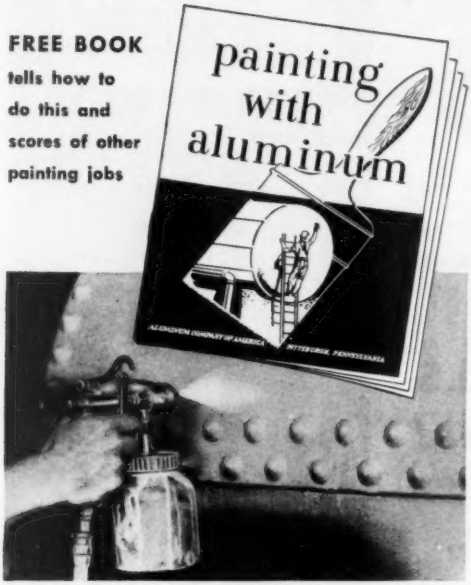

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New free book tells how to get better paint results at lower cost . . . how to buy and apply the right aluminum paints.

Alcoa does not make paint. We have prepared this book so you can know about the many new improvements in aluminum paints; can buy the correct paints without lengthy specifications and tests; can apply them best for lasting protection and good appearance.

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Address_____
City_____ State_____

Look for this shield on aluminum paints made by many paint manufacturers using ALCOA PIGMENTS.
The RIGHT aluminum paint for this job is ALUMINUM METAL & MASONRY PAINT.
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Collect it. Give it to your favorite organization. Chances are they have scheduled pickups.

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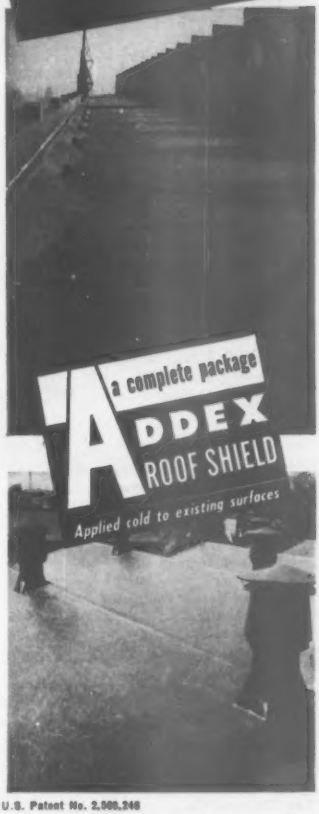

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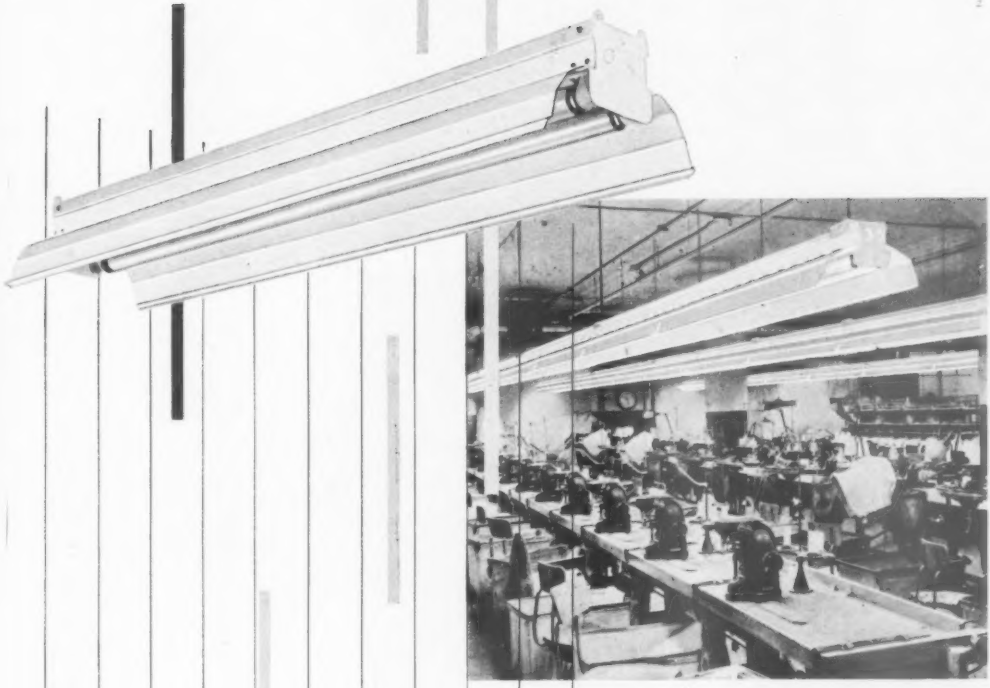

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SINCE 1844

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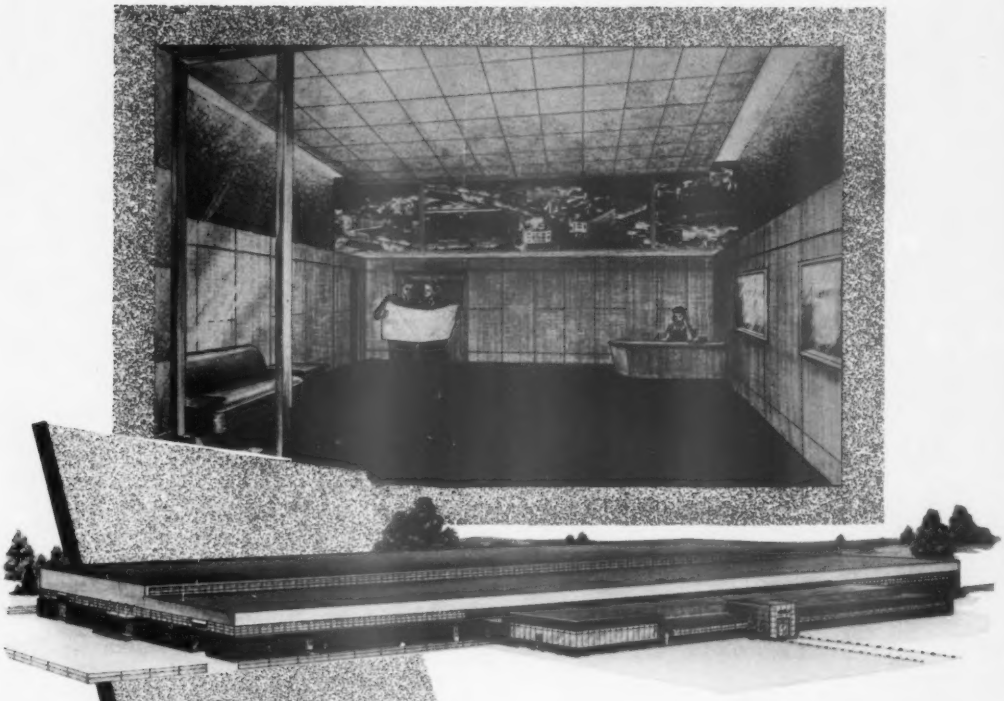

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. . . in this machine tool plant of the <u>future.</u>

One of the largest single units for grinding machine manufacture is this 6½ acre Norton plant nearing completion. It embodies both the most modern machine tool design techniques and the last word in straight-line production methods. Practical consideration is given to the comfort and ***safety*** of employees and visitors. In the attractive lobby permanent protection against slipping is provided by wear-resistant Norton Non-slip Floor Tile. Terrazzo floors in kitchen and washrooms . . . wherever water, grease, etc. might be present . . . make use of other Norton non-slip floor products. For helpful information as to colors, types and suggested specifications write for catalog #1935-FAC.

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